

## CHAPTER 5 RECOMMENDED PLAN

### PLAN FEATURES

The Recommended Plan to address the flooding problems for the city of Wharton consists of structural features in the form of earthen levees and accompanying sumps, floodwalls, a channel enlargement, storm drain type drainage structures, and an open cut ditch. These are scattered throughout the city, as shown in Figure 5-1. In concert with the information presented in Chapter 4, these features will be grouped for discussion by the primary sub-basin being benefited.

### COLORADO RIVER

The Colorado River is certainly the most obvious drainage feature in Wharton. Analysis has shown that flooding attributed to the river affect the entire city in some form. This would be significantly reduced by construction of a levee and floodwall system along the left (northeast) bank of the river, as shown in Figure 5-1. Placement of this levee protects the low lying areas along the river, and also cuts off overflows, which escape the river basin and enter the Caney Creek and Baughman Slough drainage basins.

The proposed levee/floodwalls along the river can be divided into seven distinct segments, as depicted in Table 5-1.

**Table 5-1**  
**Recommended Plan**  
**Colorado River Segments**

<i>Reach Name</i>	<i>Start Location</i>	<i>End Location</i>	<i>Average Height (ft)</i>	<i>Reach Description</i>
CR-1	0+00	78+10	4	Levee from FM 102 to US Hwy 59 embankment along the Colorado River.
CR-2	0+00	42+50	4	Levee from US Hwy 59 embankment to Station 42+50
CR-2A	42+50	46+60	6	Floodwall from Station 42+50 to landfill berm
CR-3	0+00	14+60	5	Levee from landfill berm to abandoned RR embankment
CR-4	0+00	11+90	8	Levee from abandoned RR embankment to Richmond Street
CR-5	0+00	15+00	3	Floodwall from Richmond St to park area
CR-5A	15+00	71+00	4	Levee from park area to Alabama Street (end)

All levee segments have a similar general template, with a 12 foot top width, and 1 foot vertical to 3.5 foot horizontal side slopes.

Segment CR-1 is located primarily in an open field, and runs from FM 102 in a southeasterly direction for about 4,900 feet before changing to a more easterly direction perpendicular to U.S. 59 for an additional 2,900 feet. Segment CR-1 terminates at U.S. 59, which is on top of a roadway embankment of sufficient height to form a closure. Due to the nature of

the soils in the area, there is a fairly high confidence that the U.S. 59 roadway embankment will meet or exceed the geotechnical specifications for an earthen levee.

Segment CR-2 begins on the east side of U.S. 59, and runs generally in an east southeasterly direction for about 4,000 feet before making a southward turn for the last 250 feet. At this point, the levee transitions into a reinforced concrete floodwall, which runs for about 410 feet before terminating against the high ground associated with the existing, but closed sanitary landfill. The average height of the floodwall is about 6 feet above natural ground. A floodwall section was required in this segment, due to the tight, unique topography in the immediate area.

Segment CR-3 begins on the east side of the closed landfill, and follows a southeasterly alignment for about 700 feet near the end of Ford Street, then it makes a left, generally eastward turn, and runs for another 760 feet to the abandoned railroad embankment, where it terminates.

Segment CR-4 begins near the bridge abutment of the old abandoned railroad. Its average height is substantially higher than other segments; Some portions have a height of as much as 15 feet. Thus, the overall footprint and volume is larger as it parallels the lower end of Sunset Street, before turning more northeasterly to parallel the river bank. A buffer is maintained between the toe of the levee and the river bank in order to avoid future erosion and stability issues. As the levee approaches Business 59, the required levee height decreases, and it terminates against the Business Highway 59 abutment.

Segment CR-5 is a floodwall beginning on the east side of Business 59. It then parallels Elm Street on the south side. The required height of the floodwall is only about 2 to 4 feet. As the wall passes Station 9+00 near Fulton Street, the direction of the floodwall turns southward, generally following the river for an additional 600 feet. At approximate station 15+00, the floodwall ends, and an earthen levee picks up. The levee follows the river bank for about 3,200 feet, where it turns and crosses a drainage ravine. The segment continues in this manner for approximately 3,300 feet, where it makes an abrupt left turn toward the east and heads to high ground at Alabama Road. The end of CR-5 is near the intersection of East Street and Alabama Road.

## **BAUGHMAN SLOUGH**

### **Baughman Slough Levee**

Baughman Slough is the flow path that provides drainage to the north side of Wharton. It frequently overflows its banks, causing significant flooding damages. Analysis has shown that an earthen levee or floodwall constructed along the southern bank can effectively reduce the flooding risk attributed to Baughman Slough.

For description purposes, the levee/floodwall can be divided into four segments, as indicated in Table 5-2. Three of these segments are earthen levees, which have a top width of 12 feet, and side slopes of 1 foot vertical to 3.5 feet horizontal. All segments have only a modest average height of 3-4 feet. Typical cross sections of the levee can be found in Appendix G, Plate C001. The detailed alignment of the Baughman Slough levees is depicted on Plates C101-C106.

Segment BS-1 begins at the downstream side of the abandoned railroad embankment, which is the highest ground in the area. The levee alignment is essentially parallel to Baughman Slough, with the toe staying about 20-30 feet from the bank. This alignment is maintained for the entire distance of 1,980 feet, until the levee reached Business 59 (Richmond Street). According to recent topographic surveys, Business 59 is sufficiently elevated for closure.

Figure 5-1 Recommended Plan

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Segment BS-2 picks up where BS-1 left off, and continues in the same manner as BS-1 for approximately 1,060 feet, until Fulton Street is reached. At Fulton Street, the earthen levee changes to a floodwall for a distance of 400 feet, so that there is sufficient clearance between the wall and a residential structure. The floodwall is designated as segment BS-3.

The floodwall reverts back to a standard earthen levee, known as segment BS-4, for the remaining distance of 3,570 feet until Junior College Boulevard is reached. For most of this reach, the levee is no higher than two feet above natural ground. For the last 1,200 feet upstream of Junior College Boulevard, the height is approximately 3-4 feet.

**Table 5-2**  
**Recommended Plan**  
**Baughman Slough Segments**

<i>Reach Name</i>	<i>Start Location</i>	<i>End Location</i>	<i>Average Height/Depth (ft)</i>	<i>Reach Description</i>
BS-1	0+00	19+80		Levee from abandoned RR embankment to Richmond St along Baughman Slough
BS-2	19+80	30+40		Levee from Richmond Street to Fulton Street
BS-3	30+50	34+30		Flood wall from Fulton Street to Past the home east of Fulton and south of Baughman Slough.
BS-4	34+30	70+00		Levee from flood wall to Junior College Blvd
BS-4A	49+50	70+00		75 foot bottom modified channel begins. Continuation of levee from Station 49+50
BS-5	1+20	27+80		75 foot modified channel from Junior College Blvd. to County Road 150
BS-6	27+80	49+00		75 foot modified channel from County Road 150 to end

### **Baughman Slough Channel**

In addition to the levee feature, a channel modification is also recommended for the lower reach of Baughman Slough. Its objective is to lower the tailwater under design conditions, particularly at Junior College Boulevard, which is the downstream end of the proposed levee segment.

The proposed earthen channel modification has a bottom width of 75 feet, with 1 foot vertical to 3.5 foot horizontal side slopes. Average depth of the channel is estimated to approach 4 feet.

The channel begins with a segment labeled as BS-4A. The start-of-channel location is approximately 2,100 feet upstream of Junior College Boulevard. The alignment generally follows the existing Baughman Slough channel, but it is not always centered on the existing channel. For the 2,100 foot reach upstream of Junior College Boulevard, the channel is also paralleled by the Baughman Slough levee.

Essentially the same channel configuration continues downstream of Junior College Boulevard for segments BS-5 and BS-6, for a total of 4,900 feet, including a 120 foot transition at the downstream end of the channel.

As part of the channel feature, new, wider bridges would be required for County Road 150, and for Junior College Boulevard. The bridges are anticipated to be a box culvert configuration of sufficient width to properly accommodate the new channel modification.

## **CANEY CREEK**

### **Hughes Street Drain**

Significant damages in the area along Caney Creek in the area upstream (west) of the abandoned T&NO railroad would be reduced with construction of the Hughes Street Drain. The feature consists primarily of three 60-inch reinforced concrete pipes run in parallel under Hughes Street. These would replace the current single 48-inch RCP, which is totally inadequate.

The inlet structure for the system would be located just north of the T-intersection of Hughes Street with Spanish Camp Road. The pipes would extend southward under Hughes Street for about 1300 feet, which is beyond the intersection of Hughes and Milam Streets. At this point, the pipes daylight into an existing open outfall channel. The area in and near the outlet structure is also being proposed for a sump area.

### **Polk Street Pipes**

The area along Caney Creek incurring the most damages is located in and around downtown Wharton. Potential flood damages would be addressed by installation of three 60-inch reinforced concrete pipes below the surface of Polk Street. The headwall inlet would be located immediately beyond the intersection of Polk and Caney Streets, in the northeast quadrant. The three pipes would extend 1400 feet southward, where they would outfall into the Colorado River. An outfall structure with flap gates would be located at the terminus of the pipes.

During formulation, this drainage feature was known as the Richmond Pipes, and was envisioned to be placed under Richmond Street, which is located one block to the west of Polk Street. The location was, however, modified in order to avoid conflicts with other utilities and substantially reduce traffic disruption during construction.

### **Santa Fe Ditch**

The residential neighborhood in eastern Wharton along Caney Creek incurs extensive flooding damage on a frequent basis. Construction of the Santa Fe Ditch would provide much needed relief from future flooding. The inlet of the ditch would be located near the intersection of Alabama Road and the old Santa Fe Railroad. For the upper portion, the ditch would have 1 foot vertical on 4 foot horizontal side slopes and an 8 foot bottom width, and follow the old railroad right-of-way until State Highway 60 is reached, which is a distance of approximately 5000 feet. The ditch would then turn southward, cross SH 60, and continue to the Colorado River, a distance of about 5700 feet. For this reach, the side slope would steepen to 1 foot vertical on 3 foot horizontal.

On January 25, 2006, the Assistant Secretary of the Army for Civil Works approved a request from the City of Wharton to construct this feature in advance of the Federal Project. If this project receives construction authorization from Congress, with the Santa Fe Ditch being part of the Recommended Plan, then the costs incurred by the city for advance construction would be factored into the cost apportionment. As of October 2006, all required right-of-way has been acquired, and construction has begun by the City. All designs and cost estimates for this portion of the project have been performed by firms under contract with the City of Wharton. The cost

estimates for the Santa Fe Ditch have been added to the MCACES for the remainder of the project to determine total project costs.

### **ADDITIONAL INTERIOR DRAINAGE FACILITIES**

As part of the more detailed development of the Recommended Plan, all remaining interior drainage within the project area, but not captured by the Caney Creek storage areas, were investigated in more depth. During the formulation phase, the assumption was made that these additional facilities would be fairly minimal, and would not have an influence on the overall formulation.

A detailed hydraulic and hydrologic analysis was conducted of the study area for purposes of identifying the quantity and size of the additional drainage facilities. It was realized that facilities over and above the Caney Creek areas would be needed to fulfill interior drainage needs resulting from levee construction. Nine additional areas were identified that would serve as sump areas, with seven being located along the Colorado River levee segments, and two along the Baughman Slough levee. Details of the analysis can be found in the hydrology and hydraulics portion of Appendix G.

The following assumptions were made during the hydrologic and hydraulic interior design of the additional interior drainage facilities:

1. Initial sizing of the additional facilities was performed, assuming that the project would adhere to all local, state, and Federal regulations. This assumption provided a target elevation for the 1% chance maximum water surface for each drainage facility. Higher 1% design water surface elevations (i.e, design for less than a 1% storm) would place the first floor elevations of existing residences within the pool area of the proposed drainage facilities, violate local policies, and certainly not meet the study's planning objectives. Alternatively, a lower design water surface (i.e, design for greater than a 1% storm) would not result in any additional total benefits since the system levee design itself is restricted to a 1% level.
2. The combination of reasonable real estate (\$ per acre) and excavation (\$ per cubic yard) costs allowed for elimination of pumps as an option for use in the interior drainage design. Also, it is unlikely that the electrical infrastructure in Wharton could deliver sufficient power for pumps of sufficient size. Upgrading the delivery would be cost prohibitive.
3. Sump excavation would serve as materials for levee construction.

Placement of the additional drainage facilities was performed by taking advantage of localized low areas along the proposed levee segments. In addition, areas that are primarily open fields were selected to minimize impacts to woodlands. This resulted in a greater impact to grasslands, but grasslands are more easily restored and do not take 20-50 years to get reestablished. Unfortunately, some areas, such as the Nanya Plastics sump, have unavoidable impacts due to the fact that the interior drainage naturally drains to this specific location. However, impacts to wetlands and woodlands were avoided and minimized to the extent possible by refining the initial design of the Nanya Plastics sump. The original plan would have destroyed a high quality wetland and associated woodlands by excavating the entire area. Therefore, the excavation was removed from the west arm of the sump area and the interior is slated to be excavated deeper to compensate for the loss of storage. Utilization of this guidance produced what is believed to be the most cost effective location available. However, the exact placement may be revisited as part of the Value Management process during Preconstruction Engineering, and Design.

Geotechnical investigations performed as part of the design of the recommended plan confirmed that the soils excavated from the sump areas could be used to construct the adjoining levees. Any excess material would be deposited in nearby agricultural fields, with no permanent easement requirements. This construction method has been successfully utilized by the City of Wharton in recent construction projects.

Finally, it was known during the design of these facilities that the proposed sump areas would also be used for creation of wetlands and additional tree plantings to meet environmental mitigation requirements. This dual use concept further narrowed the flexibility in determining the most cost effective sizing solutions.

The resulting approximate size and excavation requirements for the additional drainage facilities as shown in Table 5-3 below. Also shown are the costs associated with the excavation. These costs, however, are shared with the levee construction, and are not necessarily fully allocated to the cost of the sumps. However, they do provide a good indication of magnitude, and can be used for relative comparison purposes.

**Table 5-3**  
**Sump Area Pertinent Data**

Name	Levee Segment	Excavation (cu. yds)	Excavation Cost *	Area (ac)	Capacity (ac-ft)
Wal-Mart Sump	Colorado River - 1	253,000	\$1,475,000	32.3	250
Nanya Plastics Sumps	Colorado River - 2	41,000	\$239,000	41.7	356
Hughes Sump	Colorado River - 2	42,700	\$249,000	28.0	353
Ford Street Sump	Colorado River - 3	16,700	\$97,000	3.2	9
Sunset Street Sump	Colorado River - 4	25,000	\$146,000	1.7	14
Black/Rusk Street Sump	Colorado River - 5	29,500	\$172,000	3.8	21
Alabama Road Sump	Colorado River - 5	213,000	\$1,242,000	9.3	185
BS Railroad Sump	Baughman Slough	269,000	\$1,568,000	34.5	132
Ahldag Sump	Baughman Slough	156,000	\$909,000	8.4	250

\* Note: For comparison purposes only. A portion of this cost would be allocated to the levees. Other appurtenances not included.

Several observations can be made from the information provided in the table. Most notably, the size and magnitude of the additional facilities in the mid section of the Colorado River levee system, known as Segments 2, 3, and 4, validate the original assumption in terms of significance. Conversely, the facilities added to segments 1, 5, and Baughman Slough are larger and more significant. Given the original cost of the Baughman Slough levee during formulation, this facility was determined to be the highest likelihood of triggering a formulation change, and was thus investigated in greater detail. The total sump excavation cost attributed to Baughman Slough is shown in the detailed cost estimate to be approximately \$2.5 million. This compares to the original Baughman Slough levee cost of \$1.2 million. At first glance, one would conclude that such a substantial increase would certainly effect the project formulation. However, for Baughman Slough, the levee concept was the only practical alternative included in the final array of alternatives, and the selected size had a relatively high benefit to cost ratio of 5.6. Even if one assumes the entire excavation cost to be attributable to the sump, the end result would still be a benefit to cost ratio of 1.8. A non-structural floodplain evacuation plan could possibly have been formulated for the Baughman Slough area, but such plans rarely have comparable benefit to cost ratios, and in almost all cases, have a higher first cost and may not be implementable. For



example the formulated non-structural plan for the Colorado River area had a benefit to cost ratio of 0.5.

During the initial phases of Preconstruction, Engineering and Design, the additional design facilities located in segments 1 and 5 of the Colorado River levee system, as well as the Baughman Slough facilities, will be thoroughly evaluated using Value Management principles. Lower project costs than those estimated in the study are likely, which will result in a more efficient project than what is currently identified. However, it is believed that the formulation of the project is sound, and selected measures and protection levels have been properly identified.

Materials from the excavation of the proposed interior drainage structures would result in excess disposal materials even though a large portion would be utilized during the levee construction. These materials would be placed in open fields that consist of either bare ground from agricultural practices or grasslands and would be reseeded and restored to grasslands in order to minimize impacts to the environment. These areas would be permanent disposal areas and would be used as the temporary disposal areas if temporary areas are needed during construction of the levees. A maximum of 171 acres of disposal areas would be needed for permanent disposal. An analysis using GIS indicated that there are over 5,400 acres of farm fields that could be used as disposal areas within a five mile radius of the center of town.

## **ENVIRONMENTAL IMPACTS**

### **CLIMATE**

No impacts to the climate are expected as a result of activities associated with the Recommended Plan.

### **PHYSIOGRAPHY/GEOLOGY/SOILS**

The Recommended Plan would alter the soils on about 214 acres of land where the levees, sumps, and channel improvements in Baughman Slough would be constructed. The earthen levees would be seeded and returned to grassland habitat for most of the area. About 163 acres of land would be excavated for the sumps and the original grassland and forested habitat altered for temporary water storage. Much of the sump area would be reseeded with grass and trees replanted in the sumps to eventually return the area to a habitat resembling the one removed by construction.

### **PRIME AND UNIQUE FARMLANDS**

Approximately 214 acres of surface soils would be impacted by construction activities associated with the Preferred Alternative. However, about 51 acres of earthen levees would be reseeded and returned to a grassland habitat suitable for livestock grazing, except in the urban environment, and as much as 171 acres in as yet unidentified storage sites would be used for storing the excess material excavated from the sumps. These storage areas would be located in open fields and reseeded with native grasses. These areas would be available for livestock grazing and would still be available as farmlands. Only about 2,290 feet of floodwalls and 162.9 acres of sumps would be permanently altered and no longer available for agricultural use. Coordination with the NRCS on scoring project impacts to prime farmland was accomplished on 9 January 2006 and again on 7 July 2006 due to project changes. The NRCS determined that project impacts to prime farmland soils scored 118 points, which is below the threshold value of 160. Any value above 160 points would trigger analysis of project alternatives to reduce impacts to prime farmlands. Therefore, this issue does not require further consideration. A copy of the NRCS letter dated 17 July 2006 is included in Appendix H.

## **HYDROLOGY AND HYDRAULICS**

The primary impact of the project from a hydrologic and hydraulic standpoint is that for floods between the 4% annual chance of exceedance (ACE, or 25-year), and the 1% ACE (100-year), it retains more flow within the Colorado River basin. Without the levee system in place, some flows for floods in excess of the 4% ACE would escape the basin to Caney Creek and Baughman Slough. Those flows going to Baughman Slough do not return to the Colorado River basin, but instead stay in the San Bernard River basin. For the 1% ACE event, an increment of approximately 4,000 cfs is retained in the Colorado basin. It is assumed that for very rare floods that are larger than the design flow, the overflow rate remains relatively unchanged from without project conditions. It should be noted that for an event of this magnitude, the whole area is virtually underwater, under all conditions.

The rise in water surface within the extents of the levee (through the City of Wharton) ranged from 0.16' to 0.44' with an average rise throughout this reach of 0.33'. Although this rise has no impact on the City of Wharton since it is protected by the proposed levee, this rise would impact areas on the right overbank of the Colorado River not protected by a levee or other measure. This area is primarily agriculture and pasture land on the right overbank of the Colorado River opposite of the City of Wharton, as well as downstream. For the downstream area, the Colorado River water surface profile increased an average of 0.56' through the levee section from the 50-year event to the 100-year event. For economic purposes, the resulting changes have been addressed as dis-benefits totaling approximately \$3,000 annually. In addition, a real estate takings analysis has been conducted, which found no taking, is documented in Appendix E. These are considered occasional consequential damages due to the project, and they would not arise to the level of "an inevitable recurrent flood."

## **WATER QUALITY**

Construction of the proposed project could cause short-term disturbances resulting in potential impacts to water resources through soil erosion. The main potential impacts on water resources are siltation resulting from erosion and runoff from hauling and constructing the earthen levees, construction of ditches to return the stored flood waters in the sumps, and the stockpiling of excess excavated materials from the sumps. Temporary increases in suspended solids from soil erosion also increases turbidity which affects aquatic plants by reducing light penetration. In addition, extremely high turbidity levels could suffocate aquatic organisms. However, because these impacts would be temporary in nature and best management practices would be used to reduce erosion of bare earth surfaces along the levees, ditches, and stockpile areas, such as using hay bales, jute matting, silt fences, sand bags, and mulching, until the areas can be seeded to reestablish native vegetation that would help control erosion, these impacts are expected to be insignificant. Also, only the vegetation that is absolutely necessary to clear an area for construction would be removed.

To reduce the potential for petroleum products entering the Colorado River, Caney Creek, or Baughman Slough, contractors would take measures to prevent spills and leaks from their equipment. Littering in construction areas would be discouraged and surplus and waste materials would be removed from the work site and disposed of in a permitted disposal area. Spills of fuel, lubricants, or other petroleum products increase the potential for impacts to groundwater. The most effective method to avoid groundwater impacts is the proper implementation of spill-prevention and spill-response plans. Pollution from normal operation of heavy equipment during construction activities is unlikely to result in any groundwater contamination.

A Storm-Water Pollution Prevention Plan would be prepared during PED Phase and submitted to TCEQ along with a Notice of Intent to construct the project to comply with CWA Section 402(p).

## **AIR QUALITY**

Implementation of the Recommended Plan would result in a temporary reduction in forested area, which in turn could adversely affect air quality. However, in the long term the impacts would be offset due to the mitigation requirements.

There may also be minor temporary impacts to air quality due to construction equipment used during the construction activities. There would be increases in particulate matter as a result of increased dust particles in the air. Best management practices would reduce these impacts. In addition, the exhaust from the construction equipment would result in temporary impacts to air quality. These impacts would be minor since Wharton County is not classified as a "Non-attainment" area.

## **HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES**

Based on the literature search conducted in April 2003, and the environmental site reconnaissance conducted in March 2005, no identified environmental sites are located in or within 200 feet of the proposed project footprint. Thus, there are no anticipated adverse impacts as a result of implementation of the Recommended Plan.

## **AQUATIC RESOURCES**

There would be temporary impacts to the aquatic resources during project construction and until vegetation is reestablished on disturbed areas. These impacts would be as a result of storm water discharges. Fine sediments and nutrients would be transported in the storm water and deposited within the stream and river, also known as siltation. Impacts to Baughman Slough and Caney Creek would be more noticeable than to the Colorado River because of the quantity of water. Increased turbidity in the Colorado River as a result of project construction would not even be noticeable; however, there would be noticeable increased turbidity in Baughman Slough during project construction if there was a rain event that caused runoff. After the vegetation is reestablished within the channel bench and along the levee, the system and the aquatics would return to equilibrium within a few years. Best management practices would be utilized to decrease sediment transport and would hence decrease impacts to aquatic habitat.

### **Wetlands**

The USFWS National Wetland Inventory data for the project area showed scattered wetlands along parts of the Colorado River, in Baughman Slough, in tributaries feeding Baughman Slough, in Caney Creek, in old oxbows of Caney Creek, and in some swales and ditches draining some of the pastures and woodland areas outside the city. Most of these wetlands are ephemeral and contain water only after moderate to heavy rainfall events. However, these wetlands still retain wildlife value, especially during wet years. These wetlands total about 118 acres.

All of the wetlands that currently have jurisdictional status under Section 404 of the Clean Water Act and would remain jurisdictional after the project is completed, even though they would be removed from the 100-year floodplain. The wetlands in Caney Creek and its old oxbows would remain jurisdictional because they would retain their hydraulic connection to the Caney Creek watershed. The remaining wetlands that drain into Baughman Slough or the Colorado River would retain their hydraulic connections because the tributaries and drainages would be allowed to pass under the levees through culverts with flapgates on the river or slough side. The flapgates would prevent water from backing up into the city during a river rise, but the connection

and, therefore, jurisdiction over the wetlands still remains. Since none of these wetlands outside the sump areas are otherwise affected by the project, mitigation is not needed.

The only wetlands to be negatively impacted by the project are about 1.4 acres where the Colorado River crosses 7 small drainages, 5.0 acres that would be removed during channel enlargement at Baughman Slough, 2.0 acres in a drainage ditch next to the Alabama St. Sump, and 1.5 acres in the Nanya Plastics Sump. The Nanya Plastics wetlands consist of a small ditch about 5-6 feet wide and 200 feet long that drains into an ephemeral pond at the bottom of a borrow pit. During the last site visit on 15 June 2006, the total area of these wetlands was about 1 acre. Another wetland of about 2.5 acres is located on the west side of the Nanya Plastics Sump and appears to be a remnant oxbow from a past meander of Caney Creek. This is a permanent wetland of higher wildlife habitat quality than any of the other wetlands in the project area. It is circled by a 100-200-foot wide band of fairly mature forest and has several mature bald cypress trees on the perimeter of the pond. This wetland would not be removed during construction of the sump, but it could be flooded during locally heavy downpours in the area and a simultaneous rise of the river which prevents the water in the sump from draining under the levee to the river. The oxbow wetland would retain its jurisdictional status since it retains a hydraulic connection to the Colorado River through a flapgated culvert under the levee. The two smaller wetlands inside the sump would be lost during construction, but they would be recreated in the sump and revegetated with emergent vegetation and trees as part of the mitigation plan during project construction.

## **VEGETATION**

The Preferred Alternative consists of several flood protection features: a levee along the Colorado River and a segment of Baughman Slough, sumps located adjacent to the levees to collect floodwaters inside the city, channel enlargement on a section of Baughman Slough downstream of the levee, and storm water conveyance systems to drain storage areas within Caney Creek. The Preferred Alternative was designed to minimize impacts to riparian habitat along the Colorado River by pulling the flood protection levee back from the river bank as much as possible and locating the structure on the top of the river bank inside the city in an urban environment. This location also accomplished a reduction in levee height needed to provide the requisite flood protection and lowered the cost of the project. Existing features, such as the railroad embankment for the Kansas City-Southern Railroad and existing ditches were also utilized to reduce project impacts and costs. However, even with these precautions, approximately 64.9 acres of riparian/hardwood forest would be removed during project construction, along with 299.6 acres of grassland. Most of the grassland would be recreated by seeding the earthen levees and stockpile areas with native grasses. Table 5-4 lists the impacts to each vegetation type by flood damage reduction measure.

**Table 5-4**  
**Impacts of the Recommended Plan to Habitat Types**

Flood Protection Feature	Length (ft)/ Size (ac)	Habitat Impacts			
		Forest	Grass	Wetland	Resident
<b>Levee</b>					
Colorado R.	20,310 ft. (earth) 1,910 ft. (floodwall)	14.9 ac.	14.1 ac.	1.4 ac.	0
Baughman S.	6,610 ft. (earth) 380 ft. (floodwall)	7.6 ac.	14.5 ac.	0	0
<b>Channel Improvement</b>					
Baughman S.	6,830 ft. (75 ft. wide)	0	0	5.0 ac.	0
<b>Sumps</b>					
Wal-Mart	32.3 ac.	11.2 ac.	21.1 ac.	0	0
Nanya Plastics	41.7 ac.	22.5 ac.	17.7 ac.	1.5 ac.	0
Hughes St.	28.0 ac.	6.0 ac.	22.0 ac.	0	0
Ford St.	3.2 ac.	0.2 ac.	2.6 ac.	0	0.4 ac.
Sunset St.	1.7 ac.	0.8 ac.	0.2 ac.	0	0.7 ac.
Black/Collins	3.8 ac.	1.0 ac.	2.8 ac.	0	0
Alabama St.	9.3 ac.	0	7.3 ac. <sup>†</sup>	2.0 ac.	0
Baughman - Railroad	34.5 ac.	0	25.2 ac.	0	9.3 ac.
Baughman S.- Ahldag	8.4 ac.	0	8.4 ac.	0	0
<b>Caney Creek Storage</b>					
Outfall Storage Drainage	300 ft.*	0.4 ac.	0	0	0
Wharton Stor. Drainage	0	0	0	0	0
Crestmont Stor Santa Fe Ditch	250 ft.*	0.3 ac.	0	0	0
<b>Disposal Areas</b>	65 ac. < 171 ac.**	0	171 ac.	0	0
<b>Total</b>		64.9 ac.	299.6 ac.	9.9 ac.	10.4 ac.

<sup>†</sup> The Alabama St. Sump is located in a cropland and does not contain grassland, except a small amount in a ditch.

\* Distance from levee/road to river that crosses forest or wetland habitat.

\*\* The disposal areas would impact at most 171 acres if the excess materials are spread 4 feet high. Materials would only be disposed of on grass or open agricultural fields.

**Colorado River Levees** – The levees along the Colorado River generally cross (1) pastureland west of Hwy. 59, some of which contain hardwood forests; (2) riparian habitat at the Nanya Plastics site; and (3) mostly urban habitat through the city with little or no forest habitat to the east end of the project. Approximately 15 acres of riparian/hardwood forest habitat would be removed during levee construction and would be compensated as described in the mitigation plan.

**Wal-Mart Sump** – This 32.3-acre sump is located in a pastureland consisting of about 11.2 acres of hardwood forest and 21.1 acres of grassland habitat (Figure 5-1). About 253,000 cubic yards (cy) of material would be excavated from the sump, which would be used to collect water from

local flooding. Some of the excavated material would be used to construct the nearby levee and the remaining material would be stored in an open field to be identified during the PED Phase.

Nanya Plastics Sump – This 41.7-acre sump consists of about 22.5 acres of riparian/hardwood forest habitat, 1.5 acres of wetlands, and 17.7 acres of grasslands. Approximately 41,000 cy of material would be removed from the sump and stored in an open field to be identified during the PED Phase.

Hughes St. Sump – This 28-acre sump is located in pastureland and contains about 6.0 acres of hardwood forest and 22.0 acres of grassland. Approximately 42,700 cy of material would be excavated for the sump.

Ford St. Sump – This approximately 3.2-acre sump is located in an open field with a few scattered trees in an urban setting. About 16,700 acres of material would be removed from the sump.

Sunset St. Sump – This is the smallest sump in the project with an area of about 1.7 acres. It is located in a residential area and consists of open field and residential yards. About 25,000 cy of material would be removed from the sump.

Black/Collins St. Sump – This 3.8-acre sump consists of open field with some scattered trees in an urban setting. About 29,500 cy of material would be removed from the sump.

Alabama St. Sump – This 9.3-acre sump is located in a corn field at the downstream end of the Colorado River levee. A large drainage ditch runs along the north side of the sump and contains mostly brush and tall grass in the channel. Approximately 213,000 cy of material would be removed from the sump.

Baughman Slough Levee – The levee along Baughman Slough crosses about 7.6 acres of forest and 14.5 acres of grassland habitat. Material to build the levee would come from the soil excavated from the nearby sumps.

Baughman Slough Railroad Sump – This 34.5-acre sump is located at the western end of the project in a pastureland next to Baughman Slough. Approximately 9.3 acres of the site consists of residential yard with pecan trees. The rest of the sump would be excavated from 25.2 acres of pasture. About 269,000 cy of material would be removed from the sump.

Baughman Slough Ahldag Sump – This 8.4-acre sump consists of pastureland with a few scattered trees. About 156,000 cy of material would be removed to create the sump.

Disposal Areas - About 1,302,300 cy of material would be excavated for the sumps and toe collector ditches. Only about 201,300 cy of this material would be needed to construct the earthen levees, leaving about 1,102,000 cy of material that would need to be disposed of. As discussed in the Interior Drainage Section of the chapter, there would be a need of permanent disposal area of approximately 68 acres of land if the excess materials are piled 10-feet high and 171 acres would be needed if it is piled 4-feet high. These impacts would only be to upland grasslands and after the disposal is complete, the areas would be reseeded and returned to grasslands, so no mitigation would be required. An analysis using GIS indicated that there are over 5,400 acres of farm fields that could be used as disposal areas within a five mile radius of the center of town.

### **Riparian/Hardwood Forests**

The riparian/hardwood forest habitat that would be removed (approximately 65 acres as shown above) during project construction consists mostly of mature native pecan trees, with some hackberry, wooly buckthorn, cedar elm, and cottonwoods intermixed. There is very little brush or other understory vegetation, except around the base of the mature trees due to occasional mowing to maintain the pasture lands. Even the areas not used as pastureland in the urban setting are mowed frequently since they can be used for recreation. The one exception is the Nanya Plastics Sump where a more natural mix of native trees and brush can be found, including native pecan, hackberry, black willow, and cherry laurel. The non-native Chinese tallow also has invaded the area and is becoming widespread at this site. Much of this land was used as a borrow site around 12-15 years ago and the original trees and vegetation stripped for access to the sand.

Project impacts are listed for each levee and sump area separately, starting at the west end of the project area and running along the Colorado River to the east end at the Santa Fe Ditch; then the impacts will be described along Baughman Slough from west to east (downstream). Table 5-4 shows the area of forest, wetland, and grassland habitat that would be affected by project construction.

In aggregate, about 64.9 acres of riparian/hardwood forest would be removed during construction of the levee and sump system.

### **Bottomlands of Special Concern**

No impacts to bottomland of special concern would occur as a result of implanting the Recommended Plan. The Austin Woods are primarily on the other side of the Colorado River, where no construction would occur. The project impacts are primarily secondary growth trees and pecan trees.

### **Grasslands**

A total of about 299.6 acres of grasslands would be removed during project construction. Up to 171 acres would be used to store excess material excavated from the sumps, but this land would be reseeded with native grasses to reclaim its original habitat. Up to 45 acres of earthen levees would also be reseeded with native grasses to reclaim part of the lost habitat. Because this resource is neither rare nor declining on a local, regional, or national scale, it would not be included in the mitigation plan.

### **FISH AND WILDLIFE**

There would be minor impacts to fish and wildlife species during the construction of the Recommended Plan. The construction related activities would temporarily displace resident wildlife species; however, they would be expected to return to the area once construction is completed and vegetation is reestablished. The impacted habitat would be fully compensated for in the proposed mitigation plan. Approximately 148 AAHU of riparian woodlands would be lost, but 151 AAHU would be restored through the proposed mitigation. Approximately 12 AAHU of wetland habitat would be lost, but over 15 AAHU would be restored through mitigation. Since the impacts to fish and wildlife resources would be temporary and the habitat would be fully mitigated, there would be no significant impacts.

### **Threatened and Endangered Species**

A Biological evaluation was conducted for this project for the purpose of fulfilling the USACE requirements as outlined under Section 7(c) of the Endangered Species Act of 1973, as amended. The evaluation was reviewed by the USFWS to ensure that all potential project impacts have been discussed and coordinated with the appropriate agencies. Since the USACE concluded the project would not affect the only Federally-listed threatened species for the county, no further consultation was required. A description of potential project impacts to all species listed by the Federal Government and the State of Texas for Wharton County is presented below.

The bald eagle is the only species listed on the USFWS county list for Wharton County. The closest bald eagle nest to the project area is located near Glen Flora, about 5 miles upstream from the project area in the City of Wharton. Discussions with the TPWD and local city officials indicated that there were no known sightings of eagle nests or the birds roosting in the project area. However, since there is the potential for a pair of eagles to take up residence and construct a nest in the project area, the site will be reevaluated each fall just prior to and during project construction to ensure there would be no project impacts to this threatened species. The reevaluation will consist of coordination with the USFWS, TPWD, and local city officials or other knowledgeable local residents to elicit information on eagle sightings, as well as an informal survey of suitable wooded areas for nests.

The American peregrine and Arctic peregrine falcons have the potential of migrating through the project area during construction of the levees and sumps; however, the construction activities are expected to have only a temporary impact and the birds can easily avoid the area until construction is complete.

Project construction is not expected to have any impacts on the Attwater's greater prairie chicken, Eskimo curlew, whooping crane, or the interior least tern since they have little, if any, potential of occurring in the project area.

Both the white-faced ibis and white-tailed hawk are rare to uncommon visitors to Wharton County, but if they do visit the project area, it is doubtful that project construction would have any impact on these species, except a temporary one, since they can easily avoid the disturbance.

The wood stork is not a common visitor to Wharton County, but if one should wander through, it could easily avoid construction. Any impacts would be temporary.

Project construction is not expected to have any impact on the black bear or Louisiana black bear since there are no records of any occurring in the project area in recent times and there is little likelihood of one appearing in the area during project construction.

The Texas horned lizard and the timber/canebrake rattlesnake have the potential of occurring in the project area and could be adversely affected by project construction. However, the rattlesnake is more likely to avoid construction activities.

The blue sucker has the potential to occur in the Colorado River in the vicinity of the project area, but is not likely to be directly affected by construction activities since all construction would be located away from the river on higher elevations. There may be some indirect affects if soil erosion occurs on land freshly stripped of vegetation during construction and flows into the river during rains. However, the fish may avoid any local areas with higher levels of turbidity.



## **Migratory Birds**

The bottomland hardwood forests in the project area are a declining resource and critical in the survival of neotropical migrating birds. The project would remove about 64.9 acres of this habitat during project construction, but would replace it with forest habitat of nearly equal value in the mitigation plan described below and Appendix B. Therefore, project construction would temporarily remove some habitat used by migratory birds, but the habitat would be replaced and preserved in the long term during the period of analysis.

## **CULTURAL RESOURCES**

During the feasibility phase, no cultural resources sites have been identified along the proposed levee alignment, proposed sump areas, or any other areas targeted for construction activities. However, additional cultural resource work will be accomplished during Preconstruction Engineering, and Design, as well as during Construction, to insure that all potential Cultural impacts are properly addressed. Additional work may include archeological testing or monitoring during construction for deeply buried floodplain sites along Baughman's Slough and the Colorado River, survey of portions of project area not previously covered after final design, and additional historic research or evaluation of structures that may be impacted by the project for historic or architectural significance.

In order to facilitate coordination and approval of the project, a Draft Programmatic Agreement between the Corps and the Texas State Historic Preservation Office (SHPO), developed pursuant to 36 CFR 800, is contained in Appendix C to this report. The Agreement will address any additional work that needs to be done and establish guidelines for completing and coordinating the work with the SHPO. All cultural resource assessment and coordination required by 36CFR800 will be completed prior to project construction under the executed Agreement.

## **RECREATION AND PUBLIC ACCESS**

The Recommended Plan did not include any new recreation features. The levee system being recommended would be extremely suitable for use constructing a recreational trail. The City of Wharton may opt to add this feature at a later time. It would not be part of the Federal project. One city park paid for with city funds would be impacted as a result of the levee going through the middle of the area; however, once the levee is in place, the area could still be used as open space; therefore impacts to recreation would be insignificant.

## **OTHER SOCIAL EFFECTS**

### **Socioeconomic Resources**

Overall, there would be positive and negative effects to socioeconomics as a result of implementation of the recommended plan. There would be long term annual savings from the reduction in flood damages to public and privately owned properties occurring in Wharton. In addition, the city would save money on cleanup costs. There would also be short-term employment effects associated with the with-project construction that would stimulate increased demand locally for construction materials and services. These expenditures would be expected to result in a positive multiplier effect on the local community and would last for the period of construction, which is estimated at 24-months. There would be a negative reduction in local tax base as a result of taking property off of the tax roles and putting it into public ownership. The

biggest direct benefit to the residents, however, is the elimination of the need to maintain flood insurance policies. The amount of this savings varies, but it can be as much as several thousand dollars per year for a typical homeowner. There would be minor negative impacts and overall positive benefits for implementation of the Recommended Plan on socioeconomic resources.

## **Noise**

For on-site construction workers, the permissible exposure limits (PEL) and requirements for noise control are an 8-hour time-weighted average exposure level (TWA) of 90 dBA with a 5-dB exchange rate between allowable duration and noise level. Engineering or administrative controls are required to be implemented above this level, and hearing protection devices (HPDs) must be issued and worn when exposures exceed the PEL. Regulations require hearing conservation programs (HCPs) for overexposed workers. The Occupational Health and Safety Administration's Construction Regulation 1926.101 mandates the use of hearing protection above the PEL and requires insert devices to be fitted or determined individually by "competent persons" (Suter 2002). Table 5-5 provides a summary of noise exposure levels experienced by heavy equipment operators. Heavy equipment such as backhoes, front-end loaders, and cement and dump trucks would cause short-term, localized, insignificant increases in noise levels. These short-term increases are not expected to substantially affect adjacent noise sensitive receptors or wildlife areas. Construction activities would increase noise levels temporarily at locations immediately adjacent to the project area, but would be attenuated by distance, topography, and vegetation. Noise levels created by construction equipment would vary greatly depending on factors such as the type of equipment, the specific model, the operation being performed, and the condition of the equipment. The equivalent sound level of the construction activity also depends on the fraction of time that the equipment is operated over the time period of the construction. Construction would occur only during daylight hours, thus reducing the DNLs and the chances of causing annoyances. The use of BMPs such as keeping equipment in good operating condition, proper training, and providing appropriate health and safety equipment would minimize the potential noise impacts associated with the proposed action.

**Table 5-5**  
**Average Daily Noise Exposure Levels (8-hour TWA)**  
**of Heavy Equipment Operators and Associated Laborers in dBA**

<i>Operator or Task</i>	<i>Mean TWA</i>	<i>SD</i>	<i>Range</i>
Heavy-duty bulldozer	99	5	91-107
Vibrating road roller	97	4	91-104
Light-duty bulldozer	96	2	93-101
Asphalt road roller	95	4	85-103
Wheel loader	94	4	87-100
Asphalt spreader	91	3	87-97
Light-duty grader	89	1	88-91
Power shovel	88	3	80-93
Laborers	90	6	78-107
Crawler crane - .35 ton Noninsulated cab	97	2	93-101
Crawler crane - 35 ton Noninsulated cab	94	3	90-98
Insulated cab	84	3	80-89
Rubber tired cane - 35 ton	84	5	78-90
Noninsulated cab Insulated cab	74	9	59-87
Rubber tired crane - 35 ton Insulated cab	81	4	77-87
Truck-mounted crane	79	2	76-83
Tower crane	74	2	70-76

### **Traffic**

There would be temporary impacts to traffic as a result of implantation of the Recommended Plan. Construction equipment would cause minor increases in traffic inconveniences, but since traffic is so minimal in the town, these impacts would be minor. As a result of project construction Polk Street from Caney to Elm Street would be closed while project features are placed within the road right-of-way. The road would be reopened after project construction.

### **Public Health and Safety**

There would be a positive benefit to public health and safety as a result of implementing the Recommended Plan. The proposed project would provide 1% ACE flood protection to almost the entire city of Wharton. This would reduce the risk and hazards associated with flooding in Wharton. There would be no adverse impacts associated with project implementation.

### **Public Services**

There would be a benefit to public services as a result of implementation of the Recommended Plan. The strain on public resources associated with emergency services and cleanup would be reduced. There would be no adverse impacts to public services as a result of project implementation.

### **CUMULATIVE IMPACTS**

The subject of cumulative impacts, as it pertains to all known potential future actions within the Lower Colorado River Basin, has previously been addressed on the report titled *Final Programmatic Environmental Impact Statement, Flood Damage Reduction and Ecosystem*

*Restoration, Lower Colorado River Basin, Colorado River, Texas*, dated August 2005. This document is incorporated by reference.

Of particular interest is the hydrologic impacts, and the cumulative relationship between the proposed Wharton flood damage reduction project, and the Lower Colorado River/San Antonio Water System (SAWS) Project. While the SAWS project is still in the early planning stages, the concept of the project is to capture excess flood flows into off-channel storage areas. The peak capture rate may approach several thousand cubic feet per second. As noted earlier, an adverse impact of the Wharton project is that during passage of flood events with magnitudes between the 2% and 1% exceedence (50-year and 100-year) events, flow rates on the Colorado River are increased by several thousand cubic feet per second. In essence, these two projects would essentially cancel themselves out in terms of flow rate changes for these events, resulting in little to no changes downstream of Wharton if both were implemented.

There would be a potential cumulative beneficial impact to the economy from the increased potential for development as a result of the Recommended Plan. The project was not designed to allow for additional development; however, since most of the city would be protected from a 1% ACE event, some lands that were not available for development because of their location in the flood zone, may be able to be developed after project construction. This would increase the tax base of the county and the city. Exact properties were not identified, but the potential is likely. The construction that may occur would more than likely result in the loss of additional fish and wildlife habitat. However, existing wetlands would still be regulated under the Clean Water Act and any impacts would have to be permitted. This benefit would be minimal because there is already plenty of existing developable lands that are not being developed, so just because more land is available does not guarantee that it would ever be developed.

## **MITIGATION**

The mitigation plan described in detail in Appendix B was developed with the help of USFWS and TPWD personnel who participated in collecting the field data to run the HEP analysis and provided valuable advice in completing the analysis. During coordination on where mitigation was to be located, these agencies stated a strong preference for acquiring some of the bottomland hardwood habitat found at two alternative sites located along the Colorado River just outside the levee system. Both agencies would like to see this land preserved as part of the Austin's Woods (Columbia Bottomlands) Conservation Plan, which could be administered by the Nature Conservancy or as part of the Brazoria National Wildlife Refuge Complex (USFWS, 1997). However, a full analysis described below and in more detail in Appendix B, shows that all of the mitigation can take place on project lands which eliminates the need to purchase any lands outside the project for preservation.

Although preservation of these ecologically sensitive and disappearing bottomland hardwoods is a worthy and needed goal, the USACE must follow its guidance in ER 1105-2-100. One of the principal requirements for complying with this guidance is the need to demonstrate that damages to significant ecological resources (wetlands and bottomland hardwood forests) have been avoided or minimized to the extent practicable and that unavoidable damages to these resources have been compensated to the extent justified. The guidance also requires that habitat-based analyses be used to determine the amount of mitigation needed to appropriately compensate for project impacts.

The project demonstrated minimization of impacts by locating levees inside the urban area, to the extent practicable, where resources have already been impacted and relocating the sumps, as much as possible, to avoid forests and high quality wetlands. The remaining impacts to wetlands and riparian bottomland forests are unavoidable and would be fully compensated in the plan described below.

The selected mitigation plan calls for all habitat mitigation to be placed on project sump lands. There are several advantages to locating the mitigation in the sumps. First, the mitigation is located at or near the location of the lost habitat, so the original conditions are restored, or nearly so, to the impacted area. Second, the land needed for mitigation would be acquired for project construction and it would not be an additional cost to the project. Finally, almost all of the wetland construction would be done when the sumps are excavated as a project feature and very little additional cost would be incurred while doing some minor earthwork to complete the design of the wetlands. The drains would be elevated a little higher than in the normal design of the sumps so the wetlands would not completely drain after the flood waters have receded.

An incremental analysis was conducted for each habitat type that was going to be impacted and is described in detail in Appendix B. Each sump area was used as a measure and three scales were developed for possible implementation on each measure/area. Forested habitat scales were developed using seedlings, one inch caliper and two inch caliper trees. Wetland habitat scales were using low, medium or high density of cages per acre. Approximately 148.4 AAHU of riparian/forest habitat on 65 acres and 12.2 AAHU of wetlands on 10 acres would require mitigation as a result of implementing the Recommended Plan.

The results of the incremental analysis for the forested habitat show that implementing the woodland plantings using scale 2, or one inch caliper trees, in any of the sumps would be incremental justified and cost effective. Therefore, selecting a few sump locations that would attain the 148.4 AAHU of woodland impacts would satisfy the required mitigation. Since most of the woodland habitat loss is occurring in the Nanya Plastics sump and that area has the most established habitat for connectivity, this area was selected as the first location for mitigation (Figure B-10). The Nanya Plastics Sump would provide 54.73 AAHU. Furthermore, since the Wal-Mart location had the next largest impacts to woodlands, it was also selected (Figure B-9). The Wal-Mart sump would provide 44.29 AAHU, which would bring the cumulative total to 99.02. The Baughman Slough Railroad sump (Figure B-13) would provide an additional 46.27 AAHU, which would bring the cumulative total to 145.29 AAHU. Therefore, one additional sump would be required to meet the 148.4 AAHU of impact. The Ford Street sump would provide 5.94 AAHU, which would bring the cumulative total to 151.23, so it was selected as the final sump that would be used as a mitigation area. The proposed woodland planting using scale 2 in the Nanya Plastic, Wal-Mart, Baughman Slough Railroad, and Ford Street Sumps would provide the required mitigation to fully mitigate the impacts of the proposed levee and sump construction for the Wharton Project by restoring 85 acres. The projected first cost of implementing the forest mitigation is approximately \$619,500 with an average annual cost of approximately \$48,980. The annual cost per annual habitat unit would be \$324.

The results of the incremental analysis for the wetlands show that implementing any of the measures using the high density scale (40 cages per acre) would be cost effective and incrementally justified. Therefore, selecting a sump location or combinations of sump locations that would attain the 12.2 AAHU of wetland impacts would satisfy the required mitigation. Since most of the wetland habitat loss is occurring in the Nanya Plastics sump and that area has the most established habitat for connectivity, this area was selected as the first location for mitigation (Figure B-10). The Nanya Plastics Sump would provide 15.74 AAHU by restoring 10 acres. The proposed wetland planting using the High Density Scale in the Nanya Plastic sump would provide the required mitigation to fully mitigate the impacts of the proposed levee and sump construction for the Wharton Project. The projected first cost of implementing the wetland mitigation is approximately \$52,675 with an average annual cost of approximately \$4,563. The annual cost per annual habitat unit would be \$289.

The preliminary cost for implementing the mitigation plan is estimated at about \$672,175 for planting trees, shrubs, and wetland vegetation, as well as using protective cages for the wetland vegetation until they become established. An additional \$92,312 would be required for

perimeter fencing, which would bring the total first cost of mitigation to \$746,025. The perimeter fences would be to keep cattle out of the sites. Since it was a shared cost for wetlands and woodlands, the cost could not be added to the incremental analysis, it had to be added after the fact. See Appendix B for a more detailed explanation of the mitigation plan and how mitigation quantity and quality were calculated.

## **ENVIRONMENTAL COMPLIANCE**

Table 5-6 shows the status of environmental compliance of this report with applicable laws, executive orders and other environmental issues. More detailed descriptions of environmental compliance are explained where compliance issues were encountered.

### **ENDANGERED SPECIES ACT OF 1973**

The project would not affect T&E species and was coordinated with USFWS.

### **FISH AND WILDLIFE COORDINATION ACT, 1958**

A draft Fish and Wildlife Coordination Act Report dated September 2006 was received. As letter response, enclosed in Appendix H, was prepared and sent to the U.S. Fish and Wildlife Service on October 4, 2006. USFWS was involved in project formulation. A final Coordination Act Report will be included in Appendix D.

### **CLEAN WATER ACT – SECTION 404**

USACE has been directed by Congress under Section 404 of the Clean Water Act (33USC 1344) to regulate the discharge of dredged and fill material into all waters of the United States, including adjacent wetlands. The intent of Section 404 is to protect the nation's waters from indiscriminate discharge of material capable of causing pollution and to restore and maintain the chemical, physical and biological integrity of these areas. Although USACE does not issue itself permits for proposed activities which would affect waters of the U.S., USACE must meet the legal requirements of the act. The Section 404 (b)(1) analysis for the Recommended Plan is included in Appendix B. Section 401 of the Clean Water Act requires that State Water Quality Certification be obtained for the project. The proposed project was coordinated with Texas Commission on Environmental Quality and a joint public notice was issued in order to obtain Section 401 compliance. The TCEQ requested additional information, which was subsequently provided by the Corps. Water quality certification will be placed in Appendix H.

### **SECTION 106 COMPLIANCE**

Coordination was initiated with the State Historic Preservation Officer (SHPO) during the feasibility study. A draft programmatic agreement (PA) for the project component was prepared and forwarded to SHPO for their concurrence on how to address Section 106 compliance. Comments on the proposed PA were provided to the Corps and the Corps forwarded a final PA via email (included in Appendix C). A PA will be executed between the SHPO and the Corps to ensure Section 106 compliance. The Correspondence is enclosed in Appendix H.

## **EXECUTIVE ORDER 11988 – FLOOD PLAIN MANAGEMENT**

Executive Order 11988, Floodplain Management, was considered during the development of the proposed project. There are no practical alternatives to achieve the project purposes of flood damage reduction without placing fill within the floodplain. Material removed from the project area requiring disposal, as part of the proposed plan, would be placed in approved landfills for the types of materials involved. Excess material excavated from the sumps would be placed on upland pasturelands to be determined during the PED Phase. The proposed fill actions would not result in adverse environmental impacts.

## **EXECUTIVE ORDER 11990 – PROTECTION OF WETLANDS**

Executive Order 11990 was considered during the development of the proposed project. The proposed project would remove about 9.9 acres of wetlands, but these would be replaced through mitigation on project lands. Therefore, the project is in compliance with Executive Order 11990.

## **ADVISORY CIRCULAR 150-5200-33 – HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS**

The final project report will be sent to the Federal Aviation Administration (FAA) as required by the Memorandum of Agreement. There is only a very small airport in the Wharton area; therefore, it is not expected that this is an issue.

## **ENVIRONMENTAL JUSTICE**

On February 11, 1994, the President issued Executive Order (EO) number 12898, "*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations.*" In general, the order states that Federal agencies shall specifically analyze environmental effects of Federal actions, including health, economic, and social effects, on minority and low-income populations, as part of the analysis prepared for the national Environmental Policy Act (NEPA). The EO is designed to focus the attention of Federal agencies on the disproportionate impacts to health or environment that could result from undertakings in areas of minority and/or low-income communities. It further directs agencies to identify potential effects and possible mitigation measures in consultation with the identified affected communities. In order to determine potential impacts to minority and/or low-income populations within the study area, information obtained from a review of the existing demographic and census data should be combined with a series of community participation meetings.

The US Census Bureau divides the city of Wharton into 4 census tracts. All tracts have high concentrations of ethnic and racial minorities. The Hispanic population of Wharton makes up the largest minority population of the city. 31% of the population of Wharton claims some type of Hispanic descent; many are from multiracial backgrounds. Hispanic residents are distributed fairly evenly across the census tracts that make up the city. African Americans make up about 25% of the city population, but that population is not as evenly distributed across the city. The highest concentration of African Americans in Wharton is in the southern section of the city. This is the lowest income area for all census tract residents and is subject to frequent flooding from the Colorado River.

Frequent flooding is a problem in all tracts. Each tract is expected to benefits from the planned flood control project that meets NED standards. There are no buyouts planned for recreation, and only one structure is being acquired in order to build any of the proposed project components. Thus, there would be no significant adverse socio-economic effect on any minority present in the city of Wharton.

Public workshops and City Council updates were held throughout the course of the study, as documented in Chapter 6. These meetings are all open to the public, and the minority interests are well represented on the City Council. The Recommended Plan will result in the relocation of one residence, but thousands, particularly the minority and low income sector, will benefit. It is this group that generally does not have insurance to offset flooding losses.



**Table 5-6**  
**Relationship of Plan to Environmental Protection Statutes and Other**  
**Environmental Requirements**

<b><u>Policies</u></b>	<b><u>Compliance of Plan</u></b>
<b><u>Public Laws</u></b>	
Archeological and Historic Preservation Act, 1974, as amended	Plan in Full Compliance
Archeological Resources Protection Act, 1979, as amended	Plan in Full Compliance
Clean Air Act, 1977, as amended	Plan in Full Compliance
Clean Water Act, 1972, as amended	Plan in Full Compliance
Coastal Zone Management Act, 1972, as amended	Not Applicable
Endangered Species Act, 1973, as amended	Plan in Full Compliance
Farmland Protection Policy Act	Plan in Full Compliance
Fish and Wildlife Coordination Act, 1958, as amended	Plan in Full Compliance
Magnuson Fisheries Conservation and Management Act	Not Applicable
Migratory Bird Treaty Act, 1918, as amended	Plan in Full Compliance
National Environmental Policy Act, 1969, as amended	Plan in Full Compliance
National Historic Preservation Act, 1966, as amended	In Progress
Native Graves Protection and Repatriation Act, 1990	Plan in Full Compliance
Rivers and Harbor Act, 1899	Not Applicable
Wild and Scenic Rivers Act, as amended	Not Applicable
<b><u>Executive Orders</u></b>	
Environmental Justice (E.O. 12898)	Plan in Full Compliance
Flood Plain Management (E.O. 11988)	Plan in Full Compliance
Protection of Wetlands (E.O. 11990)	Plan in Full Compliance
Protection of Children from Environmental Heath Risks (E.O. 13045)	Plan in Full Compliance
<b><u>Others</u></b>	
FAA Advisory Circular 150-5200-33	Plan in Full Compliance

## **MONITORING AND ADAPTIVE MANAGEMENT**

ER 1105-2-100 allows for monitoring and adaptive management. Adaptive management for complex specifically authorized projects may be recommended. The cost of adaptive management is limited to 3 percent of the total project cost excluding monitoring costs. The Federal Government is responsible for monitoring and adaptive management. The restoration measures will be periodically surveyed to provide feedback on the response of the ecosystem to the management measures taken. By connecting the ecosystem response to the restoration as well as the management measures, potential beneficial adaptations and adjustments to the project or management plan can be identified to ensure continued success of the project. To accomplish this goal, periodic monitoring of the restoration measures by the Government will be conducted during project implementation prior to the project being turned over to the non-Federal sponsor for operation and maintenance, and will be cost-shared between the Government and the non-Federal sponsor as part of the total project cost. A monitoring and adaptive management plan will be developed during the Preconstruction, Engineering and Design phase and will not exceed five years after the end of the construction phase.

## **OPERATION, MAINTENANCE, REPAIR, REPLACEMENT AND REHABILITATION**

These costs represent the current value of materials, equipment, services, and facilities needed to operate the project and make repairs, rehabilitate, and make replacements necessary to maintain project measures in sound operating condition during the period of analysis.

The Federal Government and the city of Wharton will enter into a local cooperation agreement under which the city will accept the project after completion of construction, and insure operation and maintenance in accordance with Federal regulations. The major items of operation and maintenance include mowing of the levees and sumps, management of the open space within the project, management of the mitigation areas, and operation and maintenance of the inlet and outlet control structures pertaining to the sumps and Hughes Street and Polk Street drainage facilities. An operation and maintenance manual will be prepared by the Corps after construction completion of the project. The manual will include specific, detailed requirements for the operation and management of the levees and fish and wildlife mitigation areas. These requirements will be developed through coordination with State and Federal resource agencies to assure that environmental attributes of the project meet regulatory and agency mandates. In addition to routine operation and maintenance, the city will be responsible for repair, replacement and/or rehabilitation of all components and features of this project. Periodic inspections will be performed by Corps personnel to insure that all required maintenance is being performed.

## **PROJECT PERFORMANCE AND RISK**

The proposed Wharton flood damage reduction project relies heavily on a system of levees to keep Colorado River and Baughman Slough floodwaters from entering the city of Wharton. The design profile and height of the levees for this project was set based primarily on economic optimization. However, when urbanized, highly populated areas are being protected, minimum standards must be taken into consideration to insure the safety and welfare of the citizens. In general, levee systems for populated areas should minimally provide adequate performance to withstand the 1% annual chance of exceedence (ACE) (100-year) event. The 1% ACE floodplain, with the recommended plan in place, is shown in Figure 5-2.

Extensive hydraulic and hydrologic data exists on the Colorado River, which enables prediction of various stages versus frequency with a relatively high degree of certainty. This fact, coupled with the generally flat slope of the stage versus frequency curve in the high stages, are the primary reasons for achievement of a high performance Colorado River levee with a relatively small height over and above the 1% ACE profile. The design height included for this feasibility level design is 1 foot above the 1% ACE profile. This height produces a reliability rate of over 96%, meaning that if a 1% event were to occur on the Colorado River, there is greater than a 96% likelihood that the system would be adequate. This exceeds the amount required for levee certification as part of FEMA's flood insurance program.

Baughman Slough has substantially different factors involved. Over the years, stages and flows have not been recorded with a high degree of certainty. Thus, the level of confidence in the predicted flows and stages are not as high, resulting in broad required confidence bands. The selected design height for this feasibility level design was 1.2 feet instead of the 1 foot used on the Colorado River levees. However, due to the larger uncertainties, at this time, there is an 81% level of confidence that the 1% ACE storm event would be safely pass. During the Preconstruction Engineering and Design phase, additional hydraulic studies would be undertaken on Baughman Slough to increase the confidence levels associated with our estimates. In conjunction with higher confidence levels, the design profile may require slight modification in order to achieve the 95% level of confidence required for levee certification.

## **ECONOMIC ANALYSIS**

### **UPDATED BASELINE CONDITIONS**

Prior to performing an evaluation of the benefits associated with the Recommended Plan, an update of all structure and contents values was performed. The economic evaluation for the recommended plan is based on August 2006 prices and development levels.

### **Updated Structures And Investment**

Tables 5-7 A-D displays the number and estimated value of properties located within the economic reaches in Wharton as of 2006. There are 5,537 structures that are located within the 0.2% ACE, with a value totaling \$258,070,000. By including associated vehicles, the total estimated value increases to \$309,684,000, based on August 2006 price levels.

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Figure 5-2 - With project inundation map

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**Table 5-7A**  
**Number and Value of Structures by Stream and Reach**  
**August 2006 Price and Development levels**  
(Values in \$1,000s)

Stream/Reach Name	Structure Data		
	Category	Value	Number
Peach Creek			
Alabama to Business 59	Commercial	\$142	8
	Mobile Home	\$16	1
	Single Family Outbuilding	\$45	15
	Single Family	\$456	9
Reach Total		\$660	33
Below Alabama St	Single Family Outbuilding	\$3	2
	Single Family	\$203	2
Reach Total		\$206	4
Business 59 to Highway 59	Commercial	\$4	2
	Mobile Home	\$10	1
	Public	\$23	1
	Single Family Outbuilding	\$125	6
	Single Family	\$114	3
Reach Total		\$276	13
West of Highway 59	Commercial	\$882	3
	Mobile Home	\$325	17
	Public	\$85	3
	Single Family Outbuilding	\$3,152	194
	Single Family	\$6,068	120
Reach Total		\$10,512	337
Stream Total		\$11,654	387

**Table 5-7B**  
**Number and Value of Structures by Stream and Reach**  
**August 2006 Price and Development levels**  
(Values in \$1,000s)

Stream/Reach Name	Structure Data		
	Category	Value	Number
Baughman Slough Above Highway 59	Commercial	\$62	1
	Mobile Home	\$47	5
	Single Family Outbuilding	\$1088	49
	Single Family	\$2,456	57
	Reach Total	\$3,653	112
Alabama to Business 59	Commercial	\$6,424	69
	MFR	\$895	4
	Mobile Home	\$1,154	78
	Public	\$64,643	38
	Single Family Outbuilding	\$2,092	365
	Single Family	\$27,701	576
	Reach Total	\$102,909	1,130
Below Alabama	Commercial	\$430	13
	Multi-family	\$3,448	14
	Mobile Home	\$215	15
	Public	\$7,620	19
	Single Family Outbuilding	\$3,700	220
	Single Family	\$12,756	214
	Reach Total	\$28,169	495
Business 59 to Highway 59	Commercial	\$723	11
	Mobile Home	\$97	6
	Single Family Outbuilding	\$877	71
	Single Family	\$3,058	51
	Reach Total	\$4,755	139
Stream Total		\$139,586	1,876



**Table 5-7C**  
**Number and Value of Structures by Stream and Reach**  
**August 2006 Price and Development levels**  
(Values in \$1,000s)

<i>Stream/Reach</i>	<i>Structure Data</i>		
<i>Name</i>	<i>Category</i>	<i>Value</i>	<i>Number</i>
Caney Creek			
Above US 59	Commercial	\$1	1
	Single Family Outbuilding	\$0	1
	Single Family	\$45	1
Reach Total		\$46	3
Crestmont	Commercial	\$10	1
	Single Family Outbuilding	\$42	33
	Single Family	\$24,360	306
Reach Total		\$24,412	340
Outfall	Commercial	\$306	9
	Multi-family	\$2,319	10
	Mobile Home	\$647	47
	Single Family Outbuilding	\$399	13
	Single Family	\$2099	44
Reach Total		\$5770	123
South of HEB	Commercial	\$8	1
	Multi-family	\$136	1
	Mobile Home	\$60	4
	Public	\$1	1
	Single Family Outbuilding	\$685	40
	Single Family	\$7,040	86
Reach Total		\$7,330	133
Wharton	Commercial	\$800	22
	Mobile Home	\$142	4
	Public	\$632	8
	Single Family Outbuilding	\$504	41
	Single Family	\$12,841	209
Reach Total		\$14,919	284
Stream Total		\$52,477	883

**Table 5-7D**  
**Number and Value of Structures by Stream and Reach**  
**August 2006 Price and Development levels**  
(Values in \$1,000s)

Stream/Reach Name	Structure Data		
	Category	Value	Number
Colorado			
Above Business 59	Commercial	\$10,372	35
	Multi-family	\$1,514	4
	Mobile Home	\$941	100
	Public	\$5,488	17
	Single Family Outbuilding	\$915	208
	Single Family	\$9,361	484
Reach Total		\$28,591	848
Below Business 59 387	Commercial	\$7,688	72
	Multi-family	\$256	4
	Mobile Home Outbuilding	\$8	1
	Mobile Home	\$1,591	104
	Public	\$1,386	17
	Single Family Outbuildings	\$6,013	654
	Single Family	\$28,929	691
Reach Total		\$45,871	1,543
Stream Total		\$54,353	2,391

#### Updated Single Occurrence Flood Losses and Expected Annual Damages

Utilizing the updated economic database, the without project conditions flood losses were recomputed for the standard range of frequency storm events, ranging from a 50% Annual Chance of Exceedance (ACE, or 2-year) to 0.2% ACE (500-year). The results of the analysis are provided in Tables 5-8 A-D.

Results from the single occurrence determinations were integrated to determine an annualized damage for each economic reach. The updated total expected annual damage for the study area is estimated to be \$6.18 Million. These updated results are presented in Table 5-9. For additional details, please refer to Appendix A.

**Table 5-8A**  
**Single Event Damages – Baughman Slough**  
**August 2006 Price and Development Levels - Values in 1000's**

<i>Stream/ Reach</i>	<i>Structure</i>	<i>50%</i>	<i>20%</i>	<i>10%</i>	<i>4%</i>	<i>2%</i>	<i>1%</i>	<i>0.4%</i>	<i>0.2%</i>								
<i>Baughman</i>	<i>Type</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>	<i>No.</i>	<i>Damage</i>
Above	Commercial	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$11	1	\$14
Highway 59	Mobile Home	1	\$1	1	\$3	2	\$3	2	\$4	2	\$4	2	\$4	3	\$4	3	\$4
	Single -Family	27	\$73	47	\$137	50	\$160	54	\$178	58	\$198	60	\$216	63	\$233	66	\$251
<b>Total</b>		<b>28</b>	<b>\$73</b>	<b>48</b>	<b>\$140</b>	<b>52</b>	<b>\$163</b>	<b>56</b>	<b>\$182</b>	<b>60</b>	<b>\$202</b>	<b>62</b>	<b>\$220</b>	<b>66</b>	<b>\$248</b>	<b>70</b>	<b>\$269</b>
Alabama to	Commercial	4	\$0	6	\$3	7	\$18	10	\$42	15	\$176	36	\$399	53	\$534	68	\$721
Business 59	Multi-Family	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	2	\$240	2	\$353	2	\$469
	Mobile Home	0	\$0	1	\$5	1	\$8	2	\$10	2	\$21	27	\$140	44	\$267	76	\$488
	Public	0	\$0	2	\$19	3	\$55	3	\$75	4	\$246	29	\$4,258	35	\$6,945	38	\$9,941
	Single-Family	72	\$544	178	\$1,295	217	\$1,551	229	\$1,723	357	\$2,756	671	\$7,234	833	\$11,445	907	\$15,961
<b>Total</b>		<b>76</b>	<b>\$544</b>	<b>187</b>	<b>\$1,322</b>	<b>228</b>	<b>\$1,632</b>	<b>244</b>	<b>\$1,851</b>	<b>378</b>	<b>\$3,199</b>	<b>765</b>	<b>\$12,461</b>	<b>967</b>	<b>\$19,544</b>	<b>1091</b>	<b>\$27,580</b>
Below	Commercial	0	\$0	0	\$0	0	\$0	0	\$0	1	\$1	1	\$7	3	\$29	13	\$70
Alabama	Multi-Family	0	\$0	0	\$0	0	\$0	0	\$0	0	\$15	0	\$0	0	\$0	10	\$763
	Mobile Home	0	\$0	0	\$0	0	\$0	0	\$0	0	\$1	5	\$23	11	\$55	14	\$122
	Public	0	\$0	0	\$0	0	\$0	0	\$0	1	\$1	9	\$5	17	\$38	19	\$815
	Single-Family	30	\$116	52	\$245	63	\$338	83	\$438	172	\$1,214	300	\$3,117	345	\$5,279	403	\$8,290
<b>Total</b>		<b>30</b>	<b>\$116</b>	<b>52</b>	<b>\$245</b>	<b>63</b>	<b>\$338</b>	<b>83</b>	<b>\$438</b>	<b>174</b>	<b>\$1,234</b>	<b>315</b>	<b>\$3,152</b>	<b>376</b>	<b>\$5,401</b>	<b>459</b>	<b>\$10,060</b>
Business 59	Commercial	0	\$0	3	\$0	3	\$0	5	\$0	5	\$4	7	\$11	9	\$18	11	\$33
To Highway 59	Mobile Home	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	2	\$12	2	\$18	6	\$22
	Single -Family	39	\$184	60	\$327	75	\$437	84	\$580	93	\$746	107	\$1,023	108	\$1,165	110	\$1,302
<b>Total</b>		<b>39</b>	<b>\$184</b>	<b>63</b>	<b>\$327</b>	<b>78</b>	<b>\$437</b>	<b>89</b>	<b>\$580</b>	<b>98</b>	<b>\$750</b>	<b>116</b>	<b>\$1,046</b>	<b>119</b>	<b>\$1,201</b>	<b>127</b>	<b>\$1,357</b>
<b>Baughman Structure Totals</b>		<b>173</b>	<b>\$918</b>	<b>350</b>	<b>\$2,034</b>	<b>421</b>	<b>\$2,570</b>	<b>492</b>	<b>\$3,051</b>	<b>710</b>	<b>\$5,385</b>	<b>1258</b>	<b>\$16,779</b>	<b>1528</b>	<b>\$26,394</b>	<b>1747</b>	<b>\$39,266</b>
<b>Vehicles</b>																<b>885</b>	<b>\$6,703</b>

Stream/ Reach	Structure	50%		20%		10%		4%		2%		1%		0.4%		0.2%	
Caney Creek	Type	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage
Above Highway 59	Commercial	0	\$0	0	\$0	1	\$0	1	\$0	2	\$23	2	\$40	2	\$41	2	\$43
	Single -Family	0	\$0	1	\$0	1	\$0	1	\$0	2	\$4	2	\$7	2	\$8	3	\$10
Total		0	\$0	1	\$0	2	\$0	2	\$0	4	\$27	4	\$47	4	\$49	5	\$53
outfall	Commercial	1	\$1	8	\$10	10	\$23	10	\$26	14	\$40	14	\$44	15	\$47	17	\$51
	Multi-Family	0	\$0	1	\$25	2	\$114	3	\$203	10	\$41	10	\$625	10	\$673	10	\$719
	Mobile Home	1	\$12	10	\$44	16	\$74	18	\$86	42	\$145	45	\$164	46	\$174	46	\$185
	Single -Family	0	\$0	0	\$0	1	\$12	1	\$14	1	\$25	1	\$27	1	\$30	1	\$32
	Single -Family	3	\$12	13	\$100	25	\$186	30	\$215	39	\$385	41	\$444	42	\$477	48	\$508
Total		5	\$25	32	\$179	54	\$409	62	\$544	106	\$1,136	111	\$1,304	114	\$1,401	121	\$1,495
So of HEB	Commercial	10	\$3	11	\$4	11	\$4	11	\$4	14	\$15	14	\$18	14	\$18	14	\$19
	Mobile Home	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	1	\$4	1	\$4	1	\$4
	Mobile Home	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	1	\$4	1	\$4	1	\$4
	Public	1	\$1	1	\$1	1	\$1	1	\$1	1	\$1	1	\$1	1	\$1	1	\$1
	Single-Family	14	\$151	27	\$248	42	\$382	47	\$427	78	\$851	79	\$896	80	\$918	82	\$941
Total		25	\$157	39	\$253	54	\$382	59	\$432	95	\$873	96	\$923	97	\$945	98	\$969
Highway 59 To Rte102	Single-Family	0	\$0	0	\$0	0	\$0	2	\$3	6	\$8	6	\$21	6	\$27	7	\$54
Total		0	\$0	0	\$0	0	\$0	2	\$3	6	\$8	6	\$21	6	\$27	7	\$54
Wharton	Commercial	1	\$0	4	\$7	8	\$15	23	\$23	27	\$41	27	\$42	27	\$44	27	\$166
	Public	0	\$0	0	\$0	3	\$0	4	\$0	5	\$10	6	\$14	6	\$14	6	\$15
	Single-Family	55	\$881	82	\$1,410	92	\$1,764	98	\$1,973	111	\$2,587	113	\$2,654	113	\$2,661	113	\$2,674
Total		56	\$881	86	\$1,417	103	\$1,779	125	\$1,996	143	\$2,637	146	\$2,710	146	\$2,718	146	\$2,855
Crestmont	Commercial	0	\$0	0	\$0	0	\$0	0	\$0	1	\$0	1	\$0	2	\$3	2	\$5
	Single-Family	4	\$367	19	\$725	43	\$1,278	50	\$1,447	161	\$3,084	171	\$3,265	176	\$3,445	185	\$3,625
Total		4	\$367	19	\$725	43	\$1,278	50	\$1,447	162	\$3,084	172	\$3,265	178	\$3,448	187	\$3,630
Caney Structure Totals		90	\$1,430	105	\$2,574	146	\$3,853	298	\$4,419	311	\$7,758	324	\$8,249	330	\$8,562	564	\$9,002
Vehicles																300	\$2,129

**Table 5-8C**  
**Single Event Damages – Colorado River**  
**August 2006 Price and Development Levels - Values in 1000's**

<i>Stream/ Reach</i>	<i>Structure</i>	<i>50%</i>	<i>20%</i>	<i>10%</i>	<i>4%</i>	<i>2%</i>	<i>1%</i>	<i>0.4%</i>	<i>0.2%</i>
<i>Colorado</i>	<i>Type</i>	<i>No. Damage</i>	<i>No. Damage</i>	<i>No. Damage</i>	<i>No. Damage</i>	<i>No. Damage</i>	<i>No. Damage</i>	<i>No. Damage</i>	<i>No. Damage</i>
Above	Commercial	0	\$0 0	\$0 0	\$0 4	\$14 16	\$904 22	\$1,280 27	\$1,473 27
Business 59	MFR	0	\$0 0	\$0 0	\$0 0	\$47 1	\$244 2	\$354 3	\$416 4
	Mobile Home	0	\$0 0	\$0 0	\$0 15	\$48 45	\$122 56	\$156 60	\$170 62
	Public	0	\$0 0	\$0 0	\$0 5	\$518 8	\$595 10	\$669 11	\$706 11
	Single-Family	0	\$0 0	\$0 6	\$22 222	\$936 381	\$2,065 437	\$2,496 467	\$2,688 496
<b>Total</b>		<b>0</b>	<b>\$0 0</b>	<b>\$0 6</b>	<b>\$22 246</b>	<b>\$1,563 451</b>	<b>\$3,930 527</b>	<b>\$4,954 568</b>	<b>\$5,453 600</b>
Below	Commercial	0	\$0 0	\$0 0	\$0 7	\$3 16	\$33 33	\$75 49	\$101 58
Business 59	Mobile Home	0	\$0 0	\$0 0	\$0 3	\$7 9	\$25 10	\$33 12	\$37 13
	Public	0	\$0 0	\$0 0	\$0 1	\$3 3	\$4 7	\$27 8	\$44 9
	Single-Family	0	\$0 0	\$0 1	\$8 210	\$736 605	\$2,729 709	\$3,774 757	\$4,340 830
<b>Total</b>		<b>0</b>	<b>\$0 0</b>	<b>\$0 1</b>	<b>\$8 221</b>	<b>\$749 633</b>	<b>\$2,791 759</b>	<b>\$3,909 826</b>	<b>\$4,522 910</b>
<b>Colorado Structure Totals</b>		<b>0</b>	<b>\$0 0</b>	<b>\$0 7</b>	<b>\$30 467</b>	<b>\$2,312 1084</b>	<b>\$6,721 1286</b>	<b>\$8,863 1394</b>	<b>\$9,975 1510</b>
<b>Vehicles</b>									<b>806 \$2,448</b>

**Table 5-8D**  
**Single Event Damages – Peach Creek**  
**August 2006 Price and Development Levels - Values in 1000's**

Stream/ Reach	Structure	50%		20%		10%		4%		2%		1%		0.4%		0.2%	
Peach Creek	Type	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage	No.	Damage
Alabama	Commercial	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	8	\$30	8	\$56
To Highway 59	Mobile	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	1	\$8
	Home	0	\$0	0	\$0	0	\$0	0	\$0	1	\$8	17	\$112	24	\$306	24	\$406
	Single-Family	0	\$0	0	\$0	0	\$0	0	\$0	1	\$8	17	\$112	24	\$306	24	\$406
<b>Total</b>		<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>1</b>	<b>\$8</b>	<b>17</b>	<b>\$112</b>	<b>33</b>	<b>\$339</b>	<b>33</b>	<b>\$470</b>
Below Alabama	Single-Family	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	3	\$33	4	\$89	4	\$122
St		0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	3	\$33	4	\$89	4	\$122
<b>Total</b>		<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>3</b>	<b>\$33</b>	<b>4</b>	<b>\$89</b>	<b>4</b>	<b>\$122</b>
Business 59	Commercial	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	2	\$0	2	\$0
To Highway 59	Mobile	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	1	\$7
	Home	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	1	\$3
	Public	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	1	\$3
	Single-Family	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	2	\$12	9	\$96	9	\$163
<b>Total</b>		<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>	<b>2</b>	<b>\$12</b>	<b>13</b>	<b>\$102</b>	<b>13</b>	<b>\$173</b>
West of	Commercial	1	\$12	1	\$12	1	\$13	1	\$14	1	\$14	1	\$15	1	\$16	3	\$66
Highway 59	Mobile	1	\$8	2	\$18	2	\$25	2	\$37	3	\$53	8	\$93	10	\$160	11	\$203
	Home	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	1	\$3	2	\$5	2	\$7
	Public	40	\$225	72	\$501	112	\$903	143	\$1,402	156	\$1,917	213	\$3,388	258	\$4,336	293	\$5,499
	Single-Family	40	\$225	72	\$501	112	\$903	143	\$1,402	156	\$1,917	213	\$3,388	258	\$4,336	293	\$5,499
<b>Total</b>		<b>42</b>	<b>\$245</b>	<b>75</b>	<b>\$531</b>	<b>115</b>	<b>\$940</b>	<b>146</b>	<b>\$1,453</b>	<b>160</b>	<b>\$1,984</b>	<b>223</b>	<b>\$3,499</b>	<b>271</b>	<b>\$4,517</b>	<b>309</b>	<b>\$5,775</b>
<b>Peach Structure Totals</b>		<b>42</b>	<b>\$245</b>	<b>75</b>	<b>\$531</b>	<b>115</b>	<b>\$940</b>	<b>146</b>	<b>\$1,453</b>	<b>161</b>	<b>\$1,992</b>	<b>245</b>	<b>\$3,623</b>	<b>321</b>	<b>\$4,958</b>	<b>359</b>	<b>\$6,418</b>
<b>Vehicles</b>																<b>127</b>	<b>\$1001</b>
<b>Total All Streams</b>		<b>305</b>	<b>\$2,593</b>	<b>530</b>	<b>\$5,139</b>	<b>689</b>	<b>\$7,393</b>	<b>1,403</b>	<b>\$11,265</b>	<b>2,266</b>	<b>\$21,856</b>	<b>3,113</b>	<b>\$37,527</b>	<b>3,573</b>	<b>\$49,889</b>	<b>4,180</b>	<b>\$65,727</b>
<b>Total Vehicle Damage</b>																<b>2,118</b>	<b>\$12,281</b>

**Table 5-9**  
**Wharton Without Project**  
**Expected Annual Damages\***  
**August 2006 Price and Development Levels – Value in \$1,000's**

<i>By Stream and Reach</i>						
	Commercial	Multi-Family	Mobile Home	Public	Single-Family	Total
Peach Creek						
Below Alabama	\$1	\$0	\$0	\$0	\$1	\$1
Alabama to Business 59	\$19	\$0	\$0	\$0	\$12	\$14
Business 59 to Highway 59	\$0	\$0	\$0	\$0	\$1	\$1
West of Highway 59	\$10	\$0	\$14	\$0	\$510	\$533
<b>Total EAD</b>	<b>\$11</b>	<b>\$0</b>	<b>\$14</b>	<b>\$0</b>	<b>\$524</b>	<b>\$551</b>
Baughman Slough						
Below Alabama	\$0	\$14	\$2	\$4	\$348	\$368
Alabama to Business 59	\$58	\$12	\$12	\$255	\$1,407	\$1,744
Business 59 to Highway 59	\$3	\$0	\$1	\$0	\$307	\$311
Above Highway 59	\$3	\$0	\$1	\$0	\$127	\$132
<b>Total EAD</b>	<b>\$64</b>	<b>\$25</b>	<b>\$16</b>	<b>\$259</b>	<b>\$2,234</b>	<b>\$2,555</b>
Caney Creek						
South of HEB	\$7	\$0	\$1	\$0	\$267	\$275
Wharton	\$14	\$0	\$0	\$8	\$1,209	\$1,232
Outfall	\$11	\$47	\$30	\$0	\$164	\$252
Highway 59 to Business 59	\$0	\$0	\$0	\$0	\$4	\$4
Above Highway 59	\$1	\$0	\$0	\$0	\$1	\$1
Crestmont	\$0	\$0	\$0	\$0	\$833	\$833
<b>Total EAD</b>	<b>\$33</b>	<b>\$47</b>	<b>\$32</b>	<b>\$8</b>	<b>\$2,478</b>	<b>\$2,594</b>
Colorado River						
Below Business 59	\$5	\$0	\$3	\$3	\$182	\$193
Above Business 59	\$45	\$15	\$7	\$51	\$167	\$285
<b>Total EAD</b>	<b>\$51</b>	<b>\$15</b>	<b>\$10</b>	<b>\$55</b>	<b>\$349</b>	<b>\$478</b>
<b>EAD All Streams</b>	<b>\$159</b>	<b>\$87</b>	<b>\$72</b>	<b>\$322</b>	<b>\$5,585</b>	<b>\$6,178</b>

\*Vehicle damages are calculated into the single-family category

## COST ANALYSIS

### Projected First Cost

The projected first cost for the Recommended Plan is \$27,429,000. This includes lands and damages, relocations, channels, levees, floodwalls, sumps, environmental mitigation, engineering and design, construction management, and contingencies. The cost estimate was developed using August 2006 price levels. A summary breakdown of the costs is provided in Table 5-10. A detailed breakdown of costs in the Cost Estimate section of Volume III, Appendix G. The cost of the Santa Fe Ditch is shown separately, since it is being constructed in advance of the remainder of the project. The cost apportionment for this effort is discussed in the "Cost Apportionment" section later in this chapter.

**Table 5-10**  
**Summary of Costs by Account**  
**August 2006 Prices**

<i>Code</i>	<i>Account</i>	<i>Cost</i>	<i>Contingency</i>	<i>Total</i>
01	Lands and Damages	3,822,000	294,000	4,116,000
02	Relocations	628,000	157,000	785,000
06	Fish and Wildlife Mitigation	612,000	153,000	765,000
09	Channels and Canals	1,083,000	271,000	1,354,000
11	Levees and Floodwalls	12,344,000	3,086,000	15,430,000
30	Preconstruction, Engineering, Design	920,000	230,000	1,150,000
31	Construction Management	743,000	186,000	929,000
	Total without Santa Fe Ditch	\$20,152,000	\$4,377,000	\$24,529,000
	Santa Fe Ditch (as per Sec 104)	2,620,000	280,000	2,900,000
	<b>Total Project Cost</b>	<b>\$22,772,000</b>	<b>\$4,657,000</b>	<b>\$27,429,000</b>

### Annualized Cost

For purposes of performing a benefits versus cost comparison, the cost of the project was annualized using a 50-year period of analysis. The designated Fiscal Year 2006 interest rate of 5.125% was used to annualize the first cost.

The projected first cost includes \$13,000 associated with Relocation Assistance costs, as per Public Law 91-646. These are considered financial costs only, and not economic costs. Thus, the first cost used for economic purposes is \$27,416,000.

Prior to being annualized, interest during construction is added to the first cost to produce a total investment cost. Interest during construction is based on the current applicable fiscal year interest rate and an estimated period of construction. In addition, value of lands are charged interest during construction, as well as Preconstruction Engineering and Design (PED) costs. For the Wharton project, PED expenditures were assumed to begin in January 2007 and accumulate at a constant rate until the assumed start of construction in October 2008. The construction



period was assumed to be 24 months, with construction expenditures accumulating at a constant rate. This is highly dependent on a number of factors, including Federal funding, and even the weather conditions.

In addition to the annualized first cost, there is also an annual estimate of operation, maintenance, replacement and rehabilitation of the project facilities. These two values are summed to obtain the total annualized cost of the project, as shown in Table 5-11.

**Table 5-11**  
**Annualized Cost**  
**50 Year Analysis Period, August 2006 Prices**

<i>Description</i>	<i>Amount</i>
Project Financial First Cost	\$27,429,000
PL 99-646 Deduction	\$13,000
Project Economic First Cost	\$27,416,000
Interest During Construction	\$1,746,000
Total Investment Cost	\$29,162,000
Interest Rate	5.125%
Annualized Cost of Investment	\$1,628,000
OMRR&R	\$50,000
Total Annualized Cost	\$1,678,000

## **ECONOMIC BENEFITS SUMMARY**

Prior to computation of the flood damage reduction benefits for the Recommended Plan, the without project conditions were updated to reflect August 2006 prices. Since the existing conditions was adopted to adequately represent the hydrologic conditions for the start of the analysis period (2010), as well as the future (2060) conditions, only one set of values was needed to properly compute the project benefits for the 50-year period of analysis.

Details of the entire economic analysis can be found in Appendix A of Volume III. This includes specific information regarding the updated without project conditions, such as the number and value of all structures by reach, single event damages by reach and frequency, and expected annual damages. Similar information is also included for the with project conditions.

Table 5-12 provides an economic benefit summary of the Recommended Plan, with details for each economic reach. Benefits are shown as annualized values, and are summed to produce an estimate of the total flood damage reduction benefits attributable to the project.

**Table 5-12**  
**Economic Benefit Summary**  
**For the Recommended Plan**  
(in \$1,000's, 50-year Period of Analysis, August 2006 Prices)

<i>Economic Reach</i>	<i>Without Project</i>	<i>With Project (Residual)</i>	<i>Expected Annual Benefits</i>
Colorado River			
Below Business 59	\$193	\$23	\$170
Above Business 59	\$285	\$61	\$224
Total Colorado River	\$478	\$84	\$394
Baughman Slough			
Below Alabama	\$368	\$200	\$168
Alabama to Business 59	\$1,744	\$243	\$1,501
Business 59 to Highway 59	\$311	\$286	\$25
Above Highway 59	\$132	\$132	\$0
Total Baughman Slough	\$2,555	\$861	\$1,694
Caney Creek			
South of HEB	\$275	\$46	\$229
Wharton	\$1,232	\$264	\$968
Outfall	\$252	\$0	\$252
Highway 59 to FM 102	\$4	\$1	\$3
Above Highway 59	\$2	\$0	\$2
Crestmont	\$833	\$733	\$100
Total Caney Creek	\$2,598	\$1,044	\$1,554
<b>Total Project</b>	<b>\$5,631</b>	<b>\$1,989</b>	<b>\$3,642</b>

As shown, some residual damages would still remain. The majority of the residual damages within Wharton would be attributable to occurrence of extremely rare flood events that exceed the formulated design level of 1% annual chance of exceedance (100-year level). Despite project implementation occurrence of a 0.2% percent (500-year) storm would inundate the entire city of Wharton, as well as most of the county. More discussion on this topic is contained in the section on risk, provided in this chapter.

## BENEFIT-COST SUMMARY

The annualized flood damage reduction benefits are compared against the annualized costs of the project to determine two important economic performance parameters. The benefit to cost ratio (BCR) is determined by dividing the total annualized benefits by the total annualized costs of the project. Finally, total net benefits are found by subtracting the total costs from the total benefits. The results of these computations are shown in Table 5-13. The Recommended Plan has a benefit to cost ratio of 2.2, with total net benefits of \$1.96 Million.

**Table 5-13**  
**Benefit-Cost Summary**  
**Recommended Plan**  
**50-year Period of Analysis, 5.125% Interest, August 2006 Prices**

<i>Description</i>	<i>Factor/Value</i>
Annualized Project Benefits	\$3,642,000
Annualized Project Costs	\$1,678,000
Net Annual Benefits	\$1,964,000
Benefit-Cost Ratio	2.2

## **PROJECT COST SHARING**

The provisions of the Water Resources Development Act of 1986 (Public Law 99-662), approved November 17, 1986, stipulate cost sharing requirements applicable to flood damage reduction, which local sponsors must meet for the Federal Government to be involved with water resource projects. Cost sharing provisions for the flood damage reduction features are outlined below. The costs of removing and/or preserving cultural resources which may be discovered during implementation of this project would be borne as a 100 percent Federal cost, up to a maximum of one percent of the total Federal project costs. Should the cost of cultural resource preservation exceed this one percent limit, cost sharing provisions would be implemented.

For structural flood control projects, the non-Federal cost is to be a minimum of 35 percent and a maximum of 50 percent of total project costs. The non-Federal sponsor is responsible for 100 percent of the operation, maintenance and replacement costs of the project. In addition, the designated Sponsor would be required to formally approve the recommendations of this Feasibility Report prior to initiation the Preconstruction, Engineering, and Design Phase of the project.

### **NON-FEDERAL RESPONSIBILITIES (ITEMS OF LOCAL COOPERATION)**

Federal implementation of the recommended project would be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, including but not limited to:

- a. Provide a minimum of 35 percent, but not to exceed 50 percent of total project costs as further specified below:
  1. Provide 25 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;
  2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;
  3. Provide, during construction, a contribution of funds equal to 5 percent of total project costs;

4. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;
  5. Provide, during construction, any additional funds necessary to make its total contribution equal to at least 35 percent of total project costs;
- b. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purpose is authorized;
  - c. Not less than once each year, inform affected interests of the extent of protection afforded by the project;
  - d. Agree to participate in and comply with applicable Federal floodplain management and flood insurance programs;
  - e. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a project cooperation agreement, and to implement such plan not later than one year after completion of construction of the project;
  - f. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;
  - g. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;
  - h. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way required for construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;
  - i. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;
  - j. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the

project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating, or replacing the project;

- k. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;
- l. Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;
- m. Comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*);
- n. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended (42 U.S.C. 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal sponsor with prior specific written direction, in which case the non-Federal sponsor shall perform such investigations in accordance with such written direction;
- o. Assume, as between the Federal Government and the non-Federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project;
- p. Agree, as between the Federal Government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and
- q. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources

project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

## **COST APPORTIONMENT**

Based on the items of local cooperation listed above, the project costs can be segregated by Federal and non-Federal responsibilities. This information is provided in Table 5-10.

Table 5-10 was developed while fully recognizing the impacts as a result of the City of Wharton's application for Section 104 (Public Law 99-662) credit, which was approved by the Assistant Secretary of the Army for Civil Works by letter dated January 25, 2006. In summary, the City of Wharton has received approval to construct the Santa Fe Ditch component of the Recommended Plan in advance of the remainder of the Federal project. If this component is included as part of a Federal project that is ultimately authorized for construction by Congress, the City of Wharton will receive credit for costs incurred for the portion of the advanced construction which would have been a Federal responsibility if it had been constructed at the time of project implementation. The estimated amount of credit for this advanced construction is approximately \$1,817,000. In addition, the costs for lands, easements, rights of way, relocations, and disposal areas (LERRDs) associated with this advanced construction will be counted toward the non-Federal share of total project costs. These LERRD costs, including land acquisition and bridge/culvert relocations, are estimated at approximately \$1,083,000. The total cost for the Santa Fe Ditch, therefore, is approximately \$2,900,000. For ease in presentation of this advanced effort, the entire amount of \$2,900,000 is separated and shown as a non-Federal cost in Table 5-14.

As of October 4, 2006, the City was acquired the necessary lands for construction of the Santa Fe Ditch, and construction has been initiated. Completion is anticipated within the next 18 months.

**Table 5-14**  
**Wharton Flood Damage Reduction Project**  
**Cost Apportionment for the Recommended Plan**  
**August 2006 Prices**

<i>Account</i>	<i>Fed</i>	<i>Non-Fed</i>	<i>Total</i>
Lands and Damages		\$4,116,000	\$4,116,000
Relocations		\$785,000	\$785,000
Fish and Wildlife Mitigation	\$765,000		\$765,000
Channels and Canals	\$1,354,000		\$1,354,000
Levees and Floodwalls	\$15,430,000		\$15,430,000
Preconstruction, Engineering, Design	\$1,093,000	\$57,000	\$1,150,000
Construction Management	\$929,000		\$929,000
Santa Fe Ditch (by City, Sec 104)		\$2,900,000	\$2,900,000
Subtotal	\$19,571,000	\$7,858,000	\$27,429,000
5% Cash by Non-Fed Sponsor	-\$1,371,000	\$1,371,000	
Additional cash for 35% minimum	-\$371,000	\$371,000	
<b>Total Cost Apportionment</b>	<b>\$17,829,000</b>	<b>\$9,600,000</b>	<b>\$27,429,000</b>
<b>Cost Share Percentages</b>	<b>65.0%</b>	<b>35.0%</b>	

## **FULLY FUNDED COST ESTIMATE**

The fully funded cost estimate is intended to provide an indication of total project costs when inflation is taken into account. Inflation rates are based on rates developed as part of the Corps budgeting process. The fully funded estimate for the Wharton project is \$29,072,000.

## **FINANCIAL ANALYSIS**

### **FINANCIAL CAPABILITY**

A financial capability analysis of the City of Wharton was conducted in accordance with ER 1105-2-100 to ascertain the sponsor's financial condition and its ability to meet the cost sharing responsibilities for the proposed project. The assessment involved the calculation and analysis of nine key financial indicators. The selected indicators explain the difference in credit worthiness between communities with strong and weak credit ratings. Other relevant facts and data about the community which play a role in the analysis include population, per capita income and property tax information. Table 5-15 provides a key of the financial indicator ratings. Table 5-16 shows the indicator values and rating for the City of Wharton. The indicators, calculated values and corresponding rating have been updated to reflect the sponsors' capability as of 2005, the most recent year where all data are available, and are summarized in Table 5-17.

The population for the City of Wharton between 2000 and 2005 exhibits a 0.29 percent annual rate of change. The population growth indicator's stability in the economic base is useful

because the economic base typically rises and falls with changes in the population. In the case of the City of Wharton, the indicator is weak. Though it shows no decline in population, there is no significant growth that would expand the economic base.

The proportion of surplus/deficit expenditures to total expenditures is also a significant indicator of the community's strength. For Wharton, the ratio is 4.01% and is within average range.

The third indicator measures the efficiency of the city's tax collection system. Wharton has a collection rate of 97%, providing a near strong indicator of their ability to collect the funds to meet financial obligations.

Indicators' five through eight are used to assess the community's debt capacity. The current and future debt situation of the Wharton is very stable. Indicator five compares the amount of tax supported debt to the full market value of real property. A value that exceeds 5 percent shows a weakness, while values between three and 5 percent are considered average. The City of Wharton exhibits a strong value of 1.28 percent.

Personal income can be used as a yardstick to judge the city's ability to repay debt. Personal incomes are not reported at the city level, so data for Wharton County were used to estimate the per capita income of City of Wharton. In 2004, the personal income of Wharton County was \$1,061,253,000. Looking at population and employment trends for the region, it is reasonable that the growth in income between 2004 and 2005 would be similar to the annual rate of change between 2000 and 2004. This would give an estimate personal income of \$101,807,000. Using population data for the city of Wharton, the estimated personal income for 2004 would be \$248,389,795.

Indicator six shows net debt representing about 1.62% of personal income for the City of Wharton, which shows a strong position indicating available area income to support additional debt.

Indicators' seven and eight represent the per capita direct and overall net debt. For Wharton, the direct net per capita is \$301, which is within the better than average for most cities. Its overall net debt per capita is \$428, also indicating a stable standing.

Finally, indicator nine compares the percentage of direct net debt due within five years to total outstanding direct net debt. Wharton has a strong indicator rating of 98%.

Overall, the City of Wharton has strong showings among the nine indicators, with the exception of population growth with a weak indicator, and an average bond rating of BBB+. The indicators suggest that the city could take on additional debt.



**Table 5-15**  
**Financial Indicator Rating Key**

<i>Indicator</i>	<i>Weak</i>	<i>Average</i>	<i>Strong</i>
1. Annual rate of change in population	<1%	1%	>1%
2. Current surplus/deficit as a percent of total current expenditures	<0%	0% to 5%	> 5%
3. Real property tax collection rate	<96%	96% to 98 %	>98%
4. Property tax revenue as a percent of full market value of real property	>4%	2% to 4%	<2%
5. Overall net debt as a percent of full market value of real property	>5%	3% to 5%	<3%
6. Overall net debt outstanding as a percent of personal income	>12%	4% to 12%	<4%
7. Direct net debt per capita	>\$1,492	\$663 to \$1,492	<\$663
8. Overall net debt per capita	>\$1,989	\$829 to \$1,989	<\$829
9. Percent direct net debt outstanding due within next 5 years	<10%	10% to 30%	>30%

**Table 5-16**  
**Current Community Financial Indicator Values**  
**For the City of Wharton**

<i>Indicator</i>	<i>Value</i>	<i>Rating</i>
1. Annual rate of change in population.	0.29%	Weak
2. Current surplus/deficit as a percent of total current expenditures.	4.01	Average
3. Real property tax collection rate.	97%	Average
4. Property tax revenues as a percent of full market value of real property.	.56%	Strong
5. Overall net debt as a percent of full market value of real property	1.28%	Strong
6. Overall net debt outstanding as a percent of personal income	1.62%	Strong
7. Direct net debt per capita	\$301	Strong
8. Overall net debt per capita	\$428	Strong
9. Percent direct net debt outstanding due within next 5 years	98%	Strong

**Table 5-17**  
**City of Wharton**  
**Summary of Financial Capability**

<b>A. BOND RATINGS</b>	<b>Rating</b>	<b>Date</b>	
General Obligation	BBB+	Oct 04	
Revenue Bond	NA	NA	
<b>B. DEBT</b>	<b>Outstanding</b>	<b>Projected</b>	<b>Total</b>
General Obligation Bonds	\$6,685,000		\$6,685,000
Revenue Bonds	\$0		\$0
Gross Direct Debt			
Direct Net Debt	\$2,820,988	\$0	\$2,820,988
Overlapping Net Debt 1/	\$1,190,955		\$1,190,955
Overall Net Debt	\$4,011,943		\$4,011,943
Other Debt 2/	\$527,901		\$527,901
Estimated Future Debt	\$2,500,000		\$2,500,000
<b>C. DEBT REPAYMENT SCHEDULE (principle only)</b>			
	<b>Outstanding</b>	<b>Projected</b>	<b>Total</b>
Year 1	\$495,000	\$175,000	\$670,000
Year 2	\$545,000	\$185,000	\$730,000
Year 3	\$580,000	\$195,000	\$775,000
Year 4	\$610,000	\$205,000	\$815,000
Year 5	\$645,000	\$215,000	\$860,000
<b>D. DEBT LIMITS</b>			
There is no legal debt limit for the City. Texas municipalities are not bound by any direct constitutional or statutory maximums as to the amount of obligation bonds which may be issued; however, all local bonds must be submitted to and approved by the State Attorney General. It is the established practice of the Attorney General not to approve a prospective bond issue if it will result in a tax levy for general bonded debt of over \$1.00 for cities under 5,000 population, or \$1.50 for cities over 5,000 population.			
<sup>1</sup> Overlapping net debt is the sponsor's share of taxes owed to other taxing bodies within the community, ie., a flood district.  <sup>2</sup> Other debt obligations include outstanding leases, unfunded pension liabilities, and notes with a maturity.			

## NON FEDERAL FINANCIAL PLANNING

The purpose of strategic financial planning is to optimize the use of capital over time in response to long term financial goals. The three principal elements involved include cost recovery alternatives, if needed; selection of the preferred financing alternative; and implementation of the cost recovery approach. Although financing decisions are ultimately the sponsors', the Corps of Engineers can assist in the decision making through the provision of timely information on costs, benefits and cost recovery opportunities. The sponsor is responsible for making arrangements to finance the project sufficiently in advance of construction to enable the project schedule to be met.

## ABILITY-TO PAY ANALYSIS

Based on ER 1165-2-121 an ability-to-pay test should be applied to all flood control projects. The test determines the eligibility of the study area to qualify for a reduction in the amount to be cost shared by the Non-Federal interest. To qualify for a reduction the results of both the benefit and income portions of the twofold ability-to-pay test must fall within the specified guidelines.

The benefits' test determines the maximum reduction, called the "benefits based floor" (BBF), in the level of non-Federal cost sharing for any project. The factor is determined by dividing the project B/C ratio by four. If the factor (expressed as a percentage) is less than the standard level of cost sharing, the project may be eligible for a reduction in the non-Federal share to this BBF. The standard level cost share for a flood damage project is 25 percent. The recommended plan's B/C ratio of 1.4 was divided by four to yield a BBF of 35 percent.

The income test determines qualification for the reduction calculated in the benefit step. Qualification depends on a measure of the current economic resources of both the project area and the State in which the project is located.

In accordance with factors released in Economic Guidance 05-03, the income index factors for the state of Texas is 94.5 and for Wharton the index value is 77.16. The Eligibility Factor (EF) for a flood control project is calculated according to the following formula:

$$EF = a - b_1 * (\text{State factor}) - b_2 * (\text{area factor})$$

where:

$$a = 18.1375$$

$$b_1 = 0.0790$$

$$b_2 = 0.1579$$

Utilizing the above formula, an EF of -1.51 was calculated for Wharton. An EF less than zero indicates ineligibility for a reduction in construction cost sharing.

As stated previously, a BBF factor for the investigated plan was calculated at 35 percent. However, to qualify for a reduction, the BBF factor must be less than the standard level of cost sharing. According to ER-1165-2-121 paragraph 5a(2), the sponsor does not meet the criteria for a reduction in construction cost. This project does not meet either of the tests, therefore, the sponsors must pay the standard percentage of the total project cost.